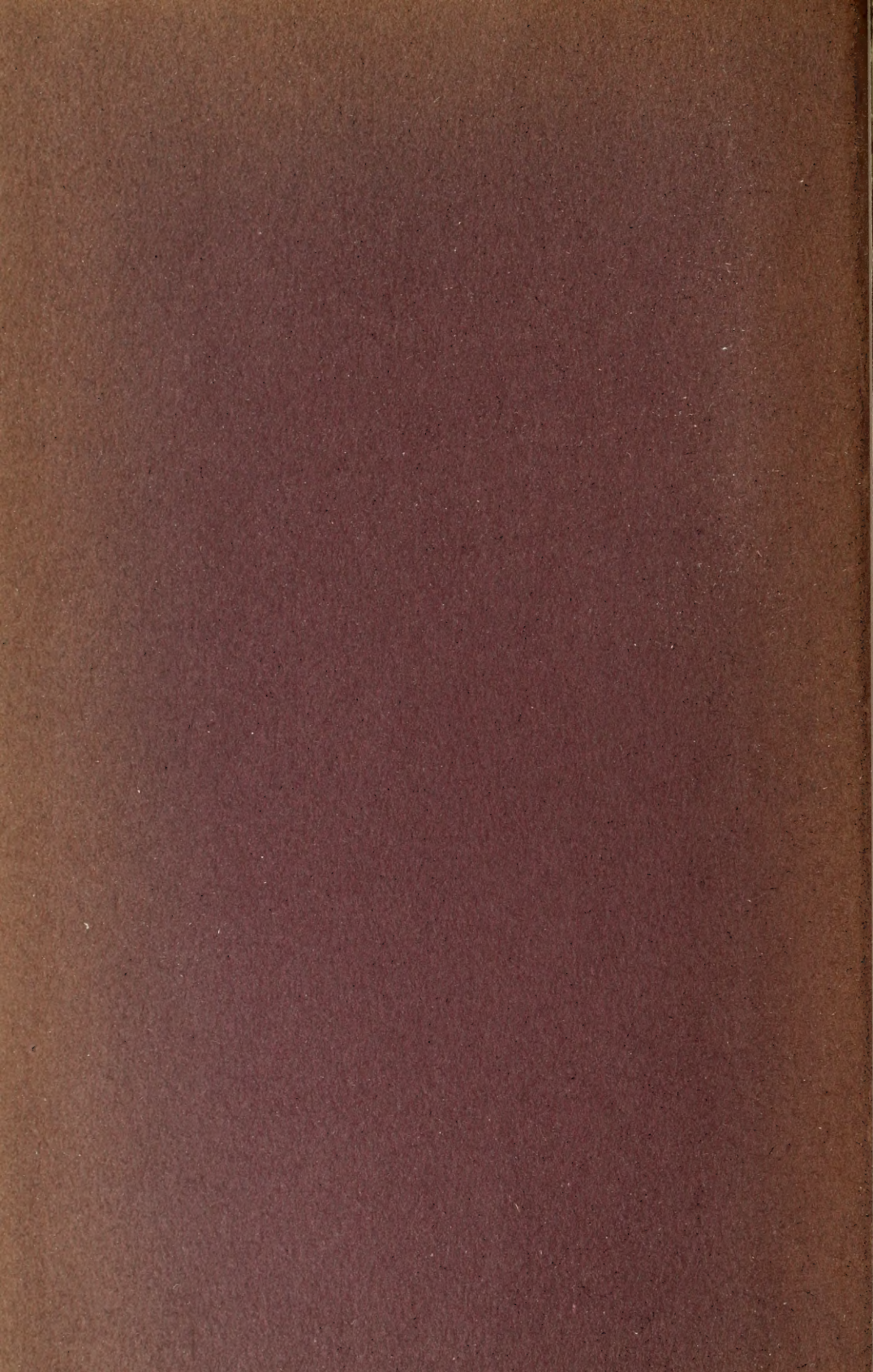
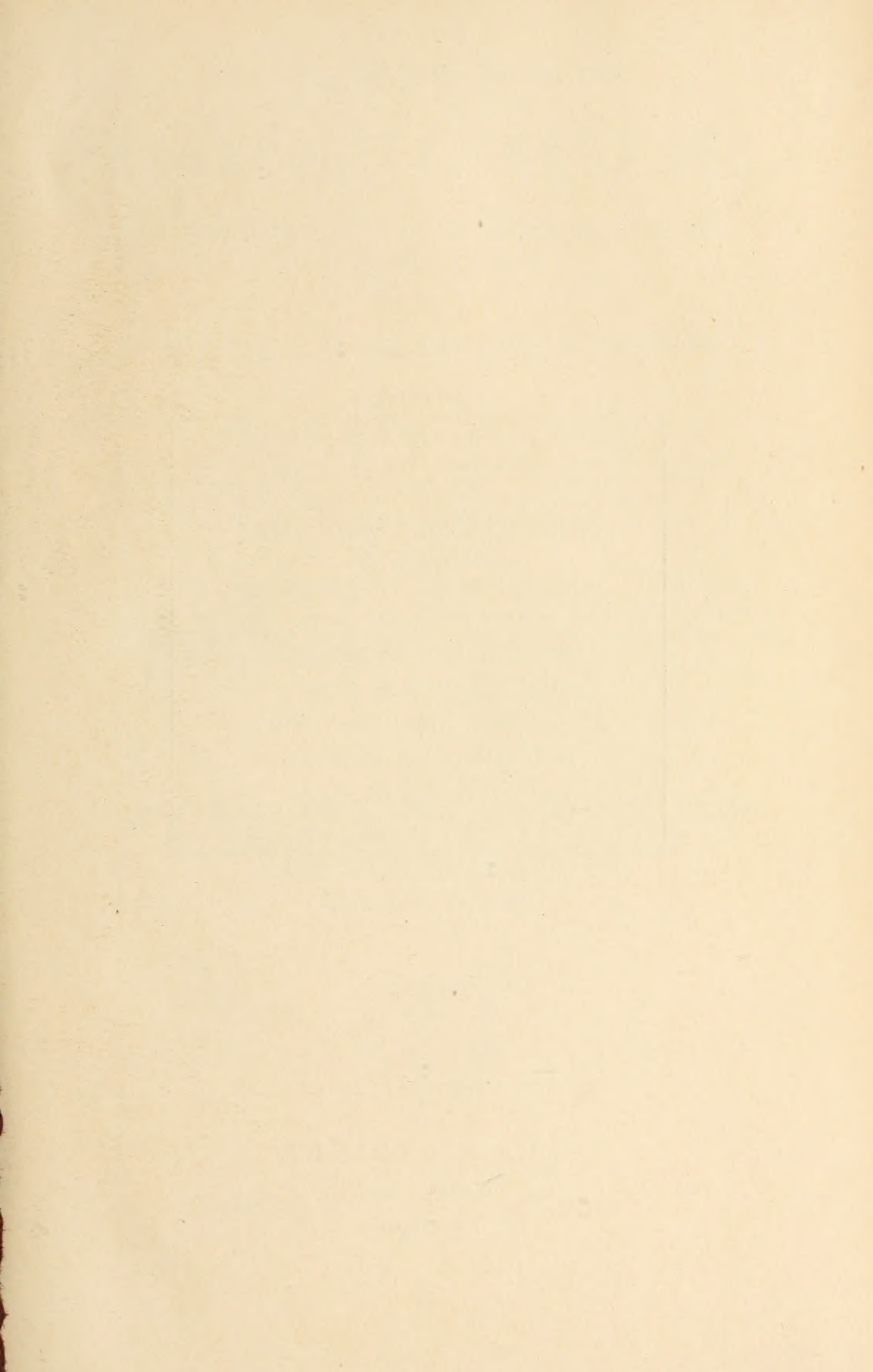




Presented to
The Library
of the
University of Toronto
by

Academy of Medicine





CONTRIBUTORS TO VOLUME I

1913

CRANDALL, FLOYD M., M.D.

DUEL, ARTHUR B., M.D.

FRAZIER, CHARLES H., M.D.

RUHRÄH, JOHN, M.D.

WOOD, GEORGE B., M.D.

PUBLISHED QUARTERLY

BY

LEA & FEBIGER

708 SANSON STREET

PHILADELPHIA

Med.
P

Awarded Grand Prize, Paris Exposition, 1900

PROGRESSIVE MEDICINE

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES
AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES

EDITED BY

HOBART AMORY HARE, M.D.

PROFESSOR OF THERAPEUTICS AND DIAGNOSIS IN THE JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA
PHYSICIAN TO THE JEFFERSON MEDICAL COLLEGE HOSPITAL; ONE TIME CLINICAL PROFESSOR
OF DISEASES OF CHILDREN IN THE UNIVERSITY OF PENNSYLVANIA; MEMBER
OF THE ASSOCIATION OF AMERICAN PHYSICIANS, ETC.

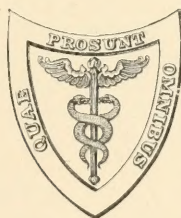
ASSISTED BY

LEIGHTON F. APPLEMAN, M.D.

INSTRUCTOR IN THERAPEUTICS, JEFFERSON MEDICAL COLLEGE, PHILADELPHIA; OPHTHALMOLOGIST TO
THE FREDERICK DOUGLASS MEMORIAL HOSPITAL; INSTRUCTOR IN OPHTHALMOLOGY, PHILA-
DELPHIA POLYCLINIC HOSPITAL AND COLLEGE FOR GRADUATES IN MEDICINE.


VOLUME I. MARCH, 1913

SURGERY OF THE HEAD, NECK, AND THORAX—INFECTIOUS DISEASES, INCLUDING
ACUTE RHEUMATISM, CROUPOUS PNEUMONIA, AND INFLUENZA
—DISEASES OF CHILDREN—RHINOLOGY AND
LARYNGOLOGY—OTOLOGY



24 7759
22. 10. 30

LEA & FEBIGER
PHILADELPHIA AND NEW YORK
1913



Entered according to the Act of Congress, in the year 1913, by
LEA & FEBIGER,
in the Office of the Librarian of Congress. All rights reserved.

LIST OF CONTRIBUTORS

JOSEPH C. BLOODGOOD, M.D.,

Associate Professor of Surgery, Johns Hopkins University, Baltimore, Md

CHARLES W. BONNEY, M.D.,

Assistant Demonstrator of Anatomy in the Jefferson Medical College, Philadelphia.

JOHN ROSE BRADFORD, M.D., F.R.C.P., F.R.S.,

Professor of Medicine in University College and Physician to the University College Hospital, London.

JOHN G. CLARK, M.D.,

Professor of Gynecology in the University of Pennsylvania, Philadelphia.

WILLIAM B. COLEY, M.D.,

Professor of Clinical Surgery, Cornell University Medical School; Attending Surgeon to the General Memorial Hospital; Attending Surgeon to the Hospital for Ruptured and Crippled.

FLOYD M. CRANDALL, M.D.,

Consulting Physician to the Infants' and Children's Hospital; Late Visiting Physician to Minturn Hospital, New York.

EDWARD P. DAVIS, M.D.,

Professor of Obstetrics in the Jefferson Medical College of Philadelphia.

ARTHUR B. DUEL, M.D.,

Professor of Otology, New York Polyclinic Medical School and Hospital; Aural Surgeon to the Manhattan Eye, Ear, and Throat Hospital, and to the Polyclinic Hospital; Otologist to the Babies' Hospital; Consulting Aural Surgeon to the Skin and Cancer Hospital, and to the New York Health Board Hospitals.

WILLIAM EWART, M.D., F.R.C.P.,

Consulting Physician to St. George's Hospital and to the Belgrave Hospital for Children, London.

CHARLES H. FRAZIER, M.D.,

Professor of Clinical Surgery in the University of Pennsylvania; Surgeon to the University, Howard, and Philadelphia Hospitals.

JOHN C. A. GERSTER, M.D.,

Instructor in Surgery, New York Polyclinic Hospital and Medical School; Attending Surgeon to the University and Bellevue Hospital Medical School's Clinic; Assistant Attending Surgeon to the City Hospital (Blackwell's Island).

EDWARD H. GOODMAN, M.D.,

Associate in Medicine, University of Pennsylvania; Assistant Physician, University Hospital and Philadelphia General Hospital; Consultant to the Medical Dispensary, University Hospital.

WILLIAM S. GOTTHEIL, M.D.,

Adjunct Professor of Dermatology, New York Post-Graduate Medical School; Consulting Dermatologist to Beth Israel and Washington Heights Hospitals; Visiting Dermatologist to the City and Lebanon Hospitals, New York City.

EDWARD JACKSON, M.D.,

Professor of Ophthalmology in the University of Colorado; Ophthalmologist to the City and County Hospital of Denver.

H. R. M. LANDIS, M.D.,

Director of the Clinical Department of the Phipps Institute of the University of Pennsylvania; Associate in Medicine, University of Pennsylvania; Visiting Physician to the White Haven Sanatorium.

JOHN RUHRÄH, M.D.,

Professor of Diseases of Children and Therapeutics, College of Physicians and Surgeons; Visiting Physician, Robert Garrett Hospital, Nursery and Child's Hospital, Mercy Hospital; Consulting Physician, Church Home and Infirmary, Baltimore.

WILLIAM G. SPILLER, M.D.,

Professor of Neuropathology and Associate Professor of Neurology in the University of Pennsylvania; Clinical Professor of Nervous Diseases in the Woman's Medical College of Pennsylvania.

ALFRED STENGEL, M.D.,

Professor of the Theory and Practice of Medicine and Clinical Medicine in the University of Pennsylvania, Philadelphia.

GEORGE B. WOOD, M.D.,

Surgeon to the Department of the Nose, Throat, and Ear, Howard Hospital; Assistant Laryngologist, Orthopædic Hospital.

CONTENTS OF VOLUME I

SURGERY OF THE HEAD, NECK, AND THORAX	17
BY CHARLES H. FRAZIER, M.D.	
INFECTIOUS DISEASES, INCLUDING ACUTE RHEUMATISM, CROUPOUS PNEUMONIA, AND INFLUENZA :	123
BY JOHN RUHRÄH, M.D.	
DISEASES OF CHILDREN	235
BY FLOYD M. CRANDALL, M.D.	
RHINOLOGY AND LARYNGOLOGY	267
BY GEORGE B. WOOD, M.D.	
OTOLOGY	311
BY ARTHUR B. DUEL, M.D.	
INDEX	355



PROGRESSIVE MEDICINE

MARCH, 1913

SURGERY OF THE HEAD, NECK, AND THORAX

BY CHARLES H. FRAZIER, M.D.

THE HEAD

The Hypophysis. Though the time when the hypophysis cerebri was one of the enigmas of the human mechanism does not date far back, yet of late the many phases of the pituitary problem have so increasingly engaged the attention of investigators in all lines of medical research that rapid strides have been made toward the solving of its mysteries and a fuller comprehension of the relation of this gland to the whole organism, both in disease and in health. And, side by side with these laboratory researches, neurologists and surgeons have been constantly making clinical observations and pathological investigations directly on the human subject until now the various symptoms of pituitary disorder are becoming quite familiar, and this obscure gland, which has been considered for so long a "*noli me tangere*," is approached with almost the same degree of success as other structures at the base of the brain. During the past year, the hypophysis has probably received more attention than any other structure of the brain, and yet much is still left unexplained, and we find much controversy over even the most fundamental of its problems, namely, its vital importance.

The pituitary body, situated in the sella turcica and surrounded by the optic tracts and chiasm, and the cavernous sinus, consists anatomically of three distinct parts: The *pars anterior* or anterior lobe, the larger of the lobes which has been proved to be derived from the mouth cavity; the *pars posterior* or posterior lobe, derived from the interbrain; and the *pars intermedia*, connecting the posterior lobe to the infundibulum. It is interesting to note that, though a part of the

brain, the hypophysis has neither pia nor arachnoid, but lies between two folds of the dura, the diaphragma sellæ, the two delicate membranes of the brain covering only the infundibulum. Hence, the sub-arachnoid space is never opened in operations on the hypophysis. The two lobes are entirely distinct embryologically, histologically, and functionally—the anterior, or glandular, lobe being an internal secreting gland, which regulates to a great extent the form of the body and the growth of bones, and the posterior, or neural, lobe, which probably influences vessels of innervation and blood pressure, but about whose real function there is still more or less mystery.¹ All these questions are dealt with very exhaustively in Tilney's² excellent monograph.

PHYSIOLOGY. While recent morphological investigators³ have demonstrated that the gland is constant in all craniates, and, therefore, functionally active, there has been and still is great difference of opinion as to the vital importance of the gland. Thus, we find Horsley, Biedl, Friedmann and Maas, Lomonaco and Rynbeck, Dalla Vedova, Fichera, Gemelli, Gaglio and Sweet upholding the theory that the hypophysis is not essential to life, as the same symptoms can be produced when the gland has not been removed; while the results of the investigations of Marinesco, Vassale and Sacchi, Gatta, Caselli, Pironne, Paulesco, Garnier, Thaon, Lïvon, Narbout, and Cushing would seem to show that viability is impossible after removal of the gland.

Castle and Ryfkogel⁴ have performed some interesting canine experiments during the past year, and have come to the same conclusions that Dalla Vedova⁵ did in 1904, namely, that complete extirpation of the hypophysis is incompatible with life, but that animals live indefinitely if a mere fragment of the infundibulum is retained, 0.2 mm. being found by Dalla Vedova sufficient to maintain life. Tilney reports six hypophysectomies performed on cats and dogs, five of which terminated fatally owing to infection following operation, as he used the old pharyngeal route of Vassale and Sacchi instead of the temporal route, which is now considered preferable in experimental work. The one surviving animal lived sixty-five days, at the end of which time he had to be killed on account of an unmanageable infection of the flank. He, however, had shown no postoperative symptoms aside from a slight change in disposition and loss of weight. It is impossible, of course, as Tilney says, to draw definite conclusions from this one isolated case. For a report of Horsley's work in this field, see *PROGRESSIVE MEDICINE*, March, 1912, page 20.

Aside from the mere question of the vital importance of the gland,

¹ Hirsch, Berl. klin. Woch., 1911, xlviii, 1933.

² Contribution to the Study of the Hypophysis Cerebri with Especial Reference to its Comparative Histology.

³ Ibid.

⁴ California State Journal of Medicine, 1912, x, No. 8.

⁵ Boll. Accad. med. di Roma., 1904, xxx, 137.

experimental work is doing much to throw light on the real function of the organ and its component parts and on the symptoms, both glandular, general, and polyglandular, following partial or complete removal, and by so doing have paved the way for intelligent diagnoses and treatment of the various lesions of this organ in man. Castle and Ryfkogel¹ have come to the conclusion, as have most experimenters, that the secretion of the hypophysis has an important influence over the nervous system, as hypophysectomized animals suffer from a train of nervous disorders. The pituitary, and especially the anterior lobe, is closely related, they think, to other ductless glands, particularly the thyroid, ovaries, and testes. General adiposity and irregular changes in urinary secretion also follow extirpation of the anterior lobe, while cachexia hypophyseopriva is not produced by the removal of the posterior lobe.

During the past three years, Ascoli and Legnani² have conducted experiments on a large number of dogs, the majority of which have died, however, a few days after the operation, showing that the hypophysis is probably a vital organ. In one case in which the dog survived the hypophysectomy for several months, they give an interesting series of photographs comparing him with a dog of the same size from the same litter. The dog operated on showed incomplete skeletal and sexual development, the sexual organs remaining in the infantile stage. The difference in structure in the spleen and thymus was especially striking, while the thyroid was more nearly normal. They used the temporal method of approach.

Aschner³ has experimented on 88 dogs to determine the relation between the hypophysis and the genitalia, and, as a result, states that, as a rule, atrophy of all the generative organs follows complete or partial extirpation of the hypophysis, and when performed before puberty, there is also adiposity and infantilism of the internal organs. His experiments have included animals of both sexes and all stages of development, and he has made careful histological comparisons between the sexual organs of the hypophysectomized animals and normal ones of the same period of development.

Livon and Peyron⁴ have made a most interesting study of hypophyso-glandular synergies, as the result of careful comparison of the various organs of a dog who had survived the partial removal of the anterior lobe seven and one-half months, with those of a normal dog of the same weight. The dog suffered from chronic hypophysial insufficiency, which manifested itself in uncertain gait, stuporous condition, adiposity, and, finally, just before death, epileptic seizures and facial convulsions.

¹ California State Journal of Medicine, 1912, x, No. 8.

² Münch. med. Woch., 1912, lix, No. 10.

³ Archiv f. Gyn., 1912, xcvii, No. 2.

⁴ Bull. Acad. de méd., 1912, lxxvii, 324.

In spite of the great increase in adipose tissue, there was practically no increase in weight, which fact is explained by a careful comparison of the organs at autopsy with those of another dog of the same weight, as follows:

	Normal dog	Hypophysectomized dog.
Heart	72.000 grains	52.110 grains
Liver	322.000 grains	179.000 grains
Right kidney	17.500 grains	13.880 grains
Left kidney	20.500 grains	14.930 grains
Right suprarenal	0.543 grains	0.242 grains
Left suprarenal	0.625 grains	0.253 grains
Spleen	31.000 grains	7.653 grains
Right thyroid	0.582 grains	0.090 grains
Left thyroid	0.497 grains	0.100 grains

The following were the autopsy findings in brief:

Hypophysis. Neural lobe normal and intact. Remains of anterior lobe show signs of cellular regeneration and secretory activity. Presence of colloid in vessels and follicles.

Thyroid. Reduced on each side to thin, sclerous plate. Diffuse sclerosis; follicles atrophied. Colloid substance mostly has disappeared. Tumefaction of the cytoplasm. Lesion of long duration and marked degree, following almost after hypophysectomy.

Liver. Fatty degeneration. No sclerosis. Lesions most marked in central lobe.

Suprarenals. Adenomatous hyperplasia. Slow in appearing.

Pancreas. No alteration.

Kidney. Marked degeneracy, especially on border of the tubules. Do not appear as soon as thyroid lesion.

Choroid Plexuses. Normal.

Testicles. Not examined.

As a result of these careful investigations, Livon and Peyron have come to the conclusion that functional troubles resulting from a localized endocranial lesion, such as hypophysectomy, are due principally to new conditions in each gland and its functional perversion, rather than to toxic or cytolytic properties of the blood.

The interglandular relations of the hypophysis have been emphasized again and again. Fichera showed that hypertrophy of the pituitary was consecutive to castration; and Alquier-Marenglii that it followed removal of the suprarenals; and Gaujoux and Peyron¹ have emphasized the relation between the hypophysis and the thyroid by demonstrating repeatedly the functional and anatomical hyperplasia of the hypophysis with thyroidectomized animals.

Somewhat in contrast with the autopsy findings of Livon and Peyron

¹ Hypertrophie de la glande hypophysaire dans un arret de developpement du corps thyroide, Reunion biologique de Marseille, 1912.

are those reported by Sweet and Allen, in a paper read before the Philadelphia Academy of Surgery, December 2, 1912, in which they report the results of 22 canine hypophysectomies. The first change which they noted in this series of experiments was the effect upon the pancreas, which appeared very red and congested, as it does at the height of digestion. The second change, taking place very soon after operation, was the atrophy of the genitalia, especially of the testicles. The former glandular alteration they found to be constant, and the latter practically so, with slight variations. They cited cases of two dogs, one of which had undergone partial extirpation and one complete, in which the testicles were found normal. The third change, which uniformly did not take place until some time after the operation, was the increase in weight, and the authors question whether possibly this adiposity is not due to the secondary atrophy of the testicle which follows so immediately upon hypophysectomy rather than primarily to loss of the hypophysis. They have used the temporal approach, and, from their experiences, advocate the use of the transfrontal method on the human subject. Regarding the vital importance of the hypophysis, they have come to the conclusion that the removal of the gland is compatible with life, as 5 of the hypophysectomized dogs lived for months without demonstrating any peculiar symptoms.

IMPLANTATION. Very little has yet been accomplished in the implantation of hypophyses. Sacerdotti made a number of transplantations in white rats and rabbits of the same species, but without any definite results. Clairmont and Ehrlich transplanted hypophyses in the host, using the spleen and abdominal wall for the implanatation, but in no case was sufficient quantity of the grafted gland present to make it possible to believe that it was functioning. Reference should here be made to Cushing's¹ experience with glandular implantation in the human subject. The patient was suffering from somnolence almost approaching unconsciousness, subnormal temperature, slow pulse and respiration, and low blood pressure. On November 11, 1911, a subtemporal decompression was performed, and no increase in tension disclosed. Glandular extracts were given by mouth in large doses, but improvement was only slight. A few weeks later, a transphenoidal operation was performed and a cyst of the hypophysis evacuated, following which there was slight and very transitory improvement. Glandular feeding was resumed by daily injections, and, finally, owing to soreness caused by injections, the hypophysis of a newborn child who had died from hemorrhage was implanted in the temporal lobe. When the report was made, it was too soon to make definite statement as to the end-results, though it seemed reasonable to believe that the implanted fragments were still functioning, at least to a certain degree, as no

¹ The Pituitary Body and its Disorders, p. 320.

further injections were necessary to prevent the patient from returning to his former somnolent state.

Castle and Ryfkogel have carried out four series of experiments on dogs, in two of which the implantation was in the subdural spaces, in one in the substance of the right frontal lobe, and in one in the medullary cavity of the femur, but an inspection of the grafts at the end of three weeks showed that they had been completely absorbed, and replaced with newly formed connective tissue. Owing to its delicate structure, the gland cannot live when implanted long enough to gain sufficient nourishment to make it capable of functioning, and it yet remains to develop a technique whereby the hypophysis may be transplanted and continue to functionate.

GLANDULAR FEEDING. The effects of glandular feeding, both in the laboratory and in the clinic, have added to our knowledge of this complex organ, though the benefits derived therefrom have been mostly of a transitory character. The most pronounced result is the effect of the extract of the posterior lobe on blood pressure. When daily injections are continued for a long time, atheroma of the aorta takes place,¹ and, when continued still longer, degenerative changes take place in the spleen and other organs. Fröhlich and Frankl-Hochwart found that increased irritation of the motor nerve fibers to the bladder followed injections of the pituitary extract of the posterior lobe. Its decided effect on blood pressure makes the extract particularly efficacious in cases of postoperative paralysis of the intestine and postoperative shock. Melchior recommends a dose of 1 c.c., repeated in an hour.

SYMPTOMATOLOGY. While organotherapy, radiotherapy, and other therapeutic measures have been followed by only transitory benefits in attempting to relieve or cure the dreadful symptoms-complex following dyspituitarism, through surgical intervention these disorders have been allayed and, in some instances, even cured. But, before we turn our attention to the technique and results of surgical intervention in this field, let us consider briefly the various phases of the symptomatology which makes the diagnosis of pituitary disease such a baffling problem. Pituitary disorders may be classified in three general groups: The first two, caused by hyper- and hyposecretion of the gland respectively, take the form of acromegaly and dystrophia adiposogenitalis; the third type may be seen in combination with one or the other of these—a type in which the symptoms are the expression of pressure upon adjacent structures or of increased intracranial pressure. There is, however, no very definite distinction between the first two groups of symptoms, as they often exist together, for, as Pick² has pointed out, dyspituitarism is not always due to hyper- or hypo-glandular function,

¹ Melchior, *Ergebnisse der Chir. u. Orthop.*, 1911, vol. iii.

² *Deutsch. med. Woch.*, 1911, xxxvii, 1930.

but rather to perverted or abnormal function of the gland, resulting often times in a combination of the two clinical pictures.

Group I. It was Pierre Marie who, in 1886, first suggested an etiological relation between acromegaly and an abnormal condition of the hypophysis, and though their exact relation is still somewhat of a bone of contention, nevertheless the diagnosis is attended with little difficulty when acromegaly is present. The following case, one of 3 which I have seen, will suffice to illustrate the hyperpituitary group. The patient, a young man, aged twenty-three years, was about fifteen when he began to have painful sensations and slight chilliness all over the body, and the fingers became numb and painful. Ever since the onset of the disease the bones of the face, hands, feet, and sternum have been constantly increasing in size, with great lack of symmetry, until, when admitted to the hospital, he was wearing a number 17 shoe. There was a tendency to hypertrichosis; the muscles were flabby; and the head was long, narrow, and asymmetrical. The inferior maxilla was extremely heavy and protruding, and the cartilages of the nose, ears, and eyelids were enlarged, giving a very coarse aspect to the features. There was such marked dorsal kyphosis that the patient bent almost double, and thrust his head forward when walking. Amsler¹ reports a case of acromegaly accompanied by splanchnomegaly in a case of hypophysial tumor. The pituitary lesion he feels was responsible for the idiopathic hypertrophy of the heart, and the arteriosclerosis and arteriosclerotic contracted kidney, and other elements of the syndrome, and he emphasizes the need of careful examination of the hypophysial region when these symptoms are present. Nothing is definitely known of the etiology of splanchnomegaly with acromegaly, but Amsler gives a very ingenious explanation based on Fischer's assumption that acromegaly is due to a hypersecretion of the anterior lobe, and the experiments of Cyon and others, showing that the posterior lobe has a direct influence on the circulation. If, as many now believe, the product of the anterior lobe passes immediately into the posterior lobe, in cases of acromegaly the posterior lobe will be overstimulated and hence the posterior lobe will in turn increase blood pressure, causing hypertrophy of the heart, thickening of the arteries, increased flow of blood to the organs, and finally splanchnomegaly. While it is still claimed by some that acromegaly does occur without a pituitary lesion, most of the collected evidence points to the fact that it is caused by a hypersecretion of the hypophysis, probably of the anterior lobe, and that the pituitary is affected in all cases.

Group II. The second group of symptoms described first by Fröhlich, in 1901, consists of certain trophic disturbances, such as

¹ Berl. klin. Woch., 1912, xlix, No. 34.

skeletal undergrowth, rapidly developing adipose tissue, and sexual infantilism associated sometimes with a smooth, transparent skin, high sugar tolerance, slowed pulse, subnormal temperature, asthenia, and stupor. To this class belonged a case, which I operated upon a short time ago, and reported to the Academy of Surgery of Philadelphia.¹ The patient, a young man, aged twenty-three years, had been a normal child up to the age of fourteen, when he was struck with a rock over the right temporal region. Two years later, he grew perceptibly weaker, his weight began constantly to increase, and he was gradually losing the sight of his right eye. When he first came under my observation in July, 1912, his appearance was that of a thick-set boy of fifteen or sixteen years, with very marked panniculus adiposus. The genitalia, infantile in type, suggested a child aged ten or twelve years. He had an enormous appetite, and was suffering from severe headaches and occasional nausea. The ocular disturbances had advanced to a state of complete right temporal hemianopsia. Aside from these marked glandular symptoms, the x-ray findings were very suggestive of pituitary trouble. As the latter showed no material deepening of the sella turcica, I felt that the lesion would be readily exposed from above, according to a technique which I will describe below. A pituitary cyst was exposed and the fluid evacuated (see Fig. 1). In this group it is also not at all rare to find, along with the above symptoms, a condition of polyuria and diabetes insipidus, attributed, as pointed out by Schäfer and others, to a glandular insufficiency of the posterior lobe. Frank² cites a very interesting case of a man who attempted to commit suicide by firing two bullets, one of which could be seen close to the sella turcica, and kept up a constant mechanical irritation of the hypophysis, resulting in permanent diabetes insipidus and tendency to adipose-genital dystrophia. He refers to similar cases of Hagenbach and Rosenhaupt, and draws the conclusion that the intermediate part of the hypophysis is a gland with an internal secretion which controls the activity of the kidneys and that essential diabetes in man is the result of excessive functioning of this gland. There is much difference of opinion as to the exact etiology of this symptom-complex. Erdheim thinks it due to a lesion or irritation of the trophic centre at the base of the brain. Fischer thinks the trophic centre does not exist in the brain proper, but in the posterior lobe of the hypophysis, and that, therefore, dystrophia adiposogenitalis is caused by an injury of the posterior lobe and infundibulum. According to Pick, however, pure cerebral dystrophia, not associated with acromegaly, may be caused by a tumor of the hypophysis or a parahypophysial lesion, or a lesion in another part of the brain, especially the cerebellum, causing pressure in the hypophysial region. It is often

¹ Annals of Surgery, February, 1913.

² Berl. klin. Woch., 1912, xlix, No. 9.

due to trauma or to a hydrocephalus. Sometimes only the floor of the third ventricle is affected, and sometimes the infundibulum and one or both lobes. The causative conditions for acromegaly and dystrophia differ, therefore, topographically and pathologically.



FIG. 1.—Taken from a photograph of the patient shortly after the author's trans-frontal operation to show the concealment of the incision. The hair on the eyebrow and scalp were inserted by the artist.

Group III. Both acromegaly and dystrophia adiposogenitalis are frequently accompanied by symptoms which owe their origin to involvement by pressure of adjacent structures, and, in some instances, these so-called neighborhood symptoms are the only expression of a diseased gland. To this class belonged a case referred to me by Dr. Mills and Dr. Weisenburg. The patient, who was in his forty-fourth year, had suffered from severe headaches, nausea, and dizziness for over two years, and during this time had had convulsive seizures on the average of once or twice a month. There was a marked change in his disposition; his mental processes became slow, and his memory defective. There were ocular disturbances, symptoms suggesting encroachment upon the uncinate region and enlargement of the sella turcica.

The most constant of the extrapituitary symptoms are those which result from injury to the optic tracts and chiasm, causing failure of vision in the temporal fields or bilateral temporal hemianopsia, and later gradual atrophy of one or both optic nerves. In 72 cases of hypophysial tumor without acromegaly collected by Frankl-Hochwart,¹

¹ Wien. med. Woch., 1909, Heft 37.

vision was found to be normal in only three instances. Among early and suggestive ocular symptoms, de Schweinitz¹ considers amblyopia, central and paracentral scotomas, and achromatopsia. Cases with choked disk and optic neuritis have also been reported, and external ocular muscle palsy is by no means rare. Exophthalmos, caused by stasis of the cavernous sinus, is present to a greater or less degree in most instances. These ocular symptoms are of the greatest importance in suspected cases of pituitary trouble, as they grow continually worse until patients become completely amaurotic if operation is delayed too long.

However, as shown by the history of my own case just referred to, other general symptoms, in the form of violent headache, usually bitemporal in character, nausea, and dizziness, usually manifest themselves before the visual disturbances become extreme. Ever since Wenzel,² in 1811, in examining the brains of 20 epileptics, discovered that the hypophysis was diseased in ten instances, the close connection between the nervous system and the pituitary has been a matter of common knowledge. Indeed, disorders of this gland are accompanied with all degrees of psychic disturbances, from mere listlessness and somnolence to various stages of dementia, and even well-defined insanity (Blair's case, cited by Tölken³). In two-thirds of the cases quoted by Frankl-Hochwart, psychic disturbances were prominent, and epilepsy itself was present in one-sixth. Among the less common expressions of derangement of this gland is hydrorrhea nasalis,⁴ and disturbances in hearing, taste, and smell, caused by pressure on the respective nerves, and, as in Cushing's two cases, trifacial neuralgia.

The order of sequence of general and glandular symptoms is generally considered to be dependent on whether the neoplasm is primary or merely parahypophysial, primary tumors of the hypophysis being usually followed first by the glandular symptoms, and, later, when the tumor increases and overflows the sella, by general pressure symptoms. While with parahypophysial lesions, the order of symptoms is just reversed.⁵

RADIOGRAPHY. Ever since Oppenheim, in 1899, discovered that enlargements of the sella turcica could be reproduced by the *x*-ray and correlated with an increase in size in the gland itself, the radiograph has held a place of vast importance in the diagnosis of disorders in the uncinate region, and should be resorted to in all cases of suspected pituitary disease. These changes in the contour of the sella, indicated by the *x*-ray picture cannot always be relied upon, however, as indica-

¹ Pennsylvania Medical Journal, 1912, xv, No. 7.

² Observations sur cervelet de epileptiques, 1811.

³ Mit. aus den Grenzgeb. der med. u. Chir., 1912, xxiv, 4 and 5.

⁴ Melchior, Berl. klin. Woch., 1912, vol. xlviii.

⁵ Van Gehuchten and Goris, Bull. Acad. roy. de méd. de Belge, 1912, xxvi, 55 to 74.

tive of a lesion of the hypophysis, as a widening of the sella may be caused by general or circumscribed hydrocephalus, chronic circumscribed meningitis, and tumors of other parts of the brain.

SURGICAL PROCEDURES. Until our knowledge of organotherapy is capable of wider application, the only means of alleviation for these distressing conditions at the present time rests with the cruder methods of surgery. The technique of operations for approaching the hypophysis has been constantly refined and improved until I now feel that, by the technique which I have recently developed, it is scarcely more difficult of performance than that for the exposure of other basal structures. There are two principal methods of approaching the hypophysis: *Intracranially* through the middle or anterior cranial fossae, and *extracranially*. I will not stop here to give a resumé of the development of these operative procedures, as this has been done many times—admirably well by Toupet in his French thesis, in 1911—but will merely try to bring out the new points in technique and the more striking of the recent cases, the number of which is constantly augmenting.

Von Eiselsberg¹ operated according to his technique, which is almost identical to Schloffer's on a woman, aged thirty years, suffering from acromegaly, ocular disturbances, and menstrual disorders. Partial removal of a malignant growth was followed by immediate improvement in vision and appearance.

During the past year Levinger² has described a technique which he has worked out on the cadaver, but never tried on the living subject, which is very similar to West's, consisting of the removal of the middle and as much as necessary of the lower turbinate in order to see the anterior wall of the sphenoidal sinus. This wall is opened, and the whole process is then repeated on the opposite side. A right angled piece of the nasal septum is next taken out and the sphenoidal septum removed, exposing the hypophysis. Levinger's method differs from West's only in proposing the resection of the septum as the first act, as in favorable cases it is possible to save both middle turbinates. Citelli,³ also a rhinologist, has developed a technique on the cadaver almost identical to those of West and Levinger, except that he advocates opening the septum as far back as possible. He considers the method of the rhinologist vastly preferable to that of the surgeon (meaning the Schloffer technique) in that the preliminary operation, which is often very grave and disfiguring, is avoided, and the danger of meningitis is at least no greater. Out of 32 operations performed according to variations of Schloffer's technique, there have been 12 deaths, 4 of which were due to meningitis, while the other 8 he attributes

¹ Wien. klin. Woch., 1912, xxv, 183.

² Ztschr. f. Ohrenh., 1912, lxiv, 332 to 349.

³ Ann. d. mal. de l'oreille, du larynx, 1911, xxxvii, 737.

to the gravity of the preliminary operation, which would have been avoided by the rhinologist's method. M. Goris¹ operated according to the Schloffer-Eiselsburg technique on an acromegalic, aged thirty-three years, suffering from severe headaches and indigestion, and found not a tumor of the hypophysis as had been indicated by the radiograph, but an intracranial sarcoma which had invaded and partially destroyed the hypophysis. The patient died the second day from meningitis, and an autopsy was made and reported by Van Gehuchten, showing that there was a parahypophysial sarcoma on the inferior surface of the median part of the brain, which certainly could not have been removed by the transphenoidal route.

Biehl² has recently devised a variation in the extracranial method, consisting in a suprahyoid pharyngotomy. The soft palate is drawn aside with a tenaculum, and the base of the skull covering the nasopharynx up to the bifurcation of the septum exposed. When the soft parts have been pushed aside, the under wall of the sphenoidal sinus is opened, the floor removed, and the hypophysis readily exposed. Owing to his success in experimental work on the cadaver, Biehl advocates this method very strongly. During the past year Chiari³ has developed a still different technique which combines, to a certain degree, the two methods of approach. He recommends an orbital approach, in which an incision is made from the inner edge of the orbit along the outer margin of the nasal bone down to the maxillary process. The eyeball is then easily drawn outward, the posterior part of the nasal and the sphenoidal septums are resected, and the hypophysis exposed. Chiari considers the resulting disfigurement slight, since only a small portion of the nasal framework is removed. In both cases the wounds have healed smoothly, and the functional outcome thus far has been good.

Bogojawlensky,⁴ in January, 1912, reported to the Eleventh Congress of Russian Surgeons at Moscow a successful operation which he had performed on a man, aged thirty-five years, suffering from acromegaly, according to a frontal approach. The operation was carried out in two sittings, at the first of which a craniotomy was performed, an osteoplastic flap 9 cm. in breadth and length was turned back 2.5 cm. from the median line and the same distance from the upper edge of the orbit. Then 10 to 15 mm. of bone were removed from the edge of the bony opening in the skull, and the flap replaced. Six weeks later, at the second sitting, after raising the osteoplastic flap, an H-shaped incision was made in the dura, and the two flaps thus formed turned back. Then the patient's head was lowered over the edge of the table

¹ Bull. Acad. roy. de méd. de Belge, 1912, xxvi, 55.

² Zentralbl. f. Chir., January 6, 1912.

³ Wien. klin. Woch., 1912, vol. xxv, No. 1.

⁴ Zentralbl. f. Chir., 1912, xxxix, No. 7.

and the right frontal lobe very carefully pushed from the roof of the orbit, first with the finger, then with a Krause retractor. A good exposure of the optic nerves and chiasm was then secured, and a tumor about the size of a cherry was readily seen and removed. The dura was sutured and the flap replaced. There was complete operative recovery, and two and one-half months after the operation Bogojawlensky reports that there is marked retrogression in the acromegalic symptoms, the length of the nose having decreased 1 cm. and the fingers from 10 to 15 mm.

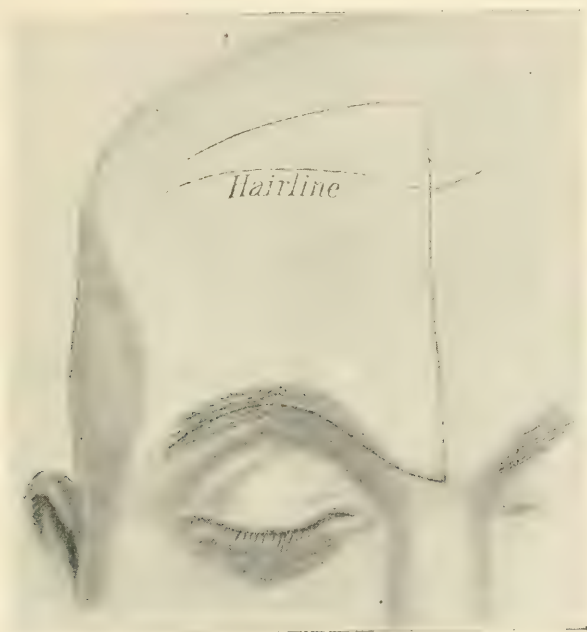


FIG. 2.—Drawing showing the relation of the incision to the eyebrow and the hairline.

McArthur¹ has recently elaborated a somewhat similar technique based on his previous experience in two cases of tumors of the hypophysis. The patient's head is placed over the end of the table, which is elevated to 30 degrees. An incision is made through the eyebrow, passing down to the bone, from the inner end of the eyebrow to the external aspect of the external angular process. A perpendicular incision 3 to 4 cm. long is then made from the midnasal end of the first incision, and the various tissues separated from the bone and turned upward. A small button of bone is removed from the frontal prominence 4 cm. above the middle of the supra-orbital ridge, which is preserved in normal

¹ Journal of the American Medical Association, 1912, lviii, No. 26.

saline solution. A curvilinear incision is then made, ending at the outer aspect of the external angular process. The external angular process is severed with a sharp osteotome, as is also the outer wall of the frontal sinus, and the fragment thus formed, together with about half the orbital roof, is removed and placed in normal saline solution. The remainder of the orbital roof is then rongeured away, the frontal

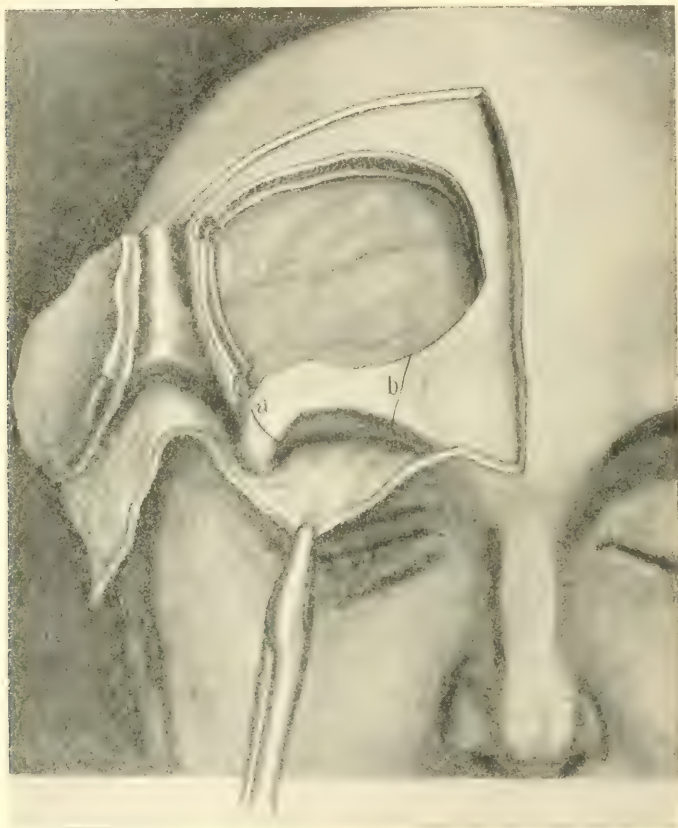


FIG. 3.—Drawing showing the reflection of the osteoplastic flap, and between lines *a* and *b* the positions of the supra-orbital ridge to be resected.

lobe raised, and the orbital contents displaced downward. Through a transverse incision, 2 to 3 cm. long, in the dura between the clinoid processes, the pituitary can be readily seen. McArthur claims that the frontal fragment can be easily replaced and that the cosmetic results should be very satisfactory.

I will here refer to a technique which I¹ have elaborated and which has made the exposure of the hypophysis seem quite as feasible as

¹ *Annals of Surgery*, February, 1912.

that of the exposure of the Gasserian ganglion and other structures at the base of the brain. It is, I may say, a modification of the procedure advocated by McArthur, but possesses, I believe, certain definite advantages to the latter's technique. The operation consists in the reflection of an osteoplastic flap from the right frontal region (see Fig. 2), after which the supra-orbital ridge and a portion of the roof of the orbit are removed *en bloc* and placed in normal saline solution, later

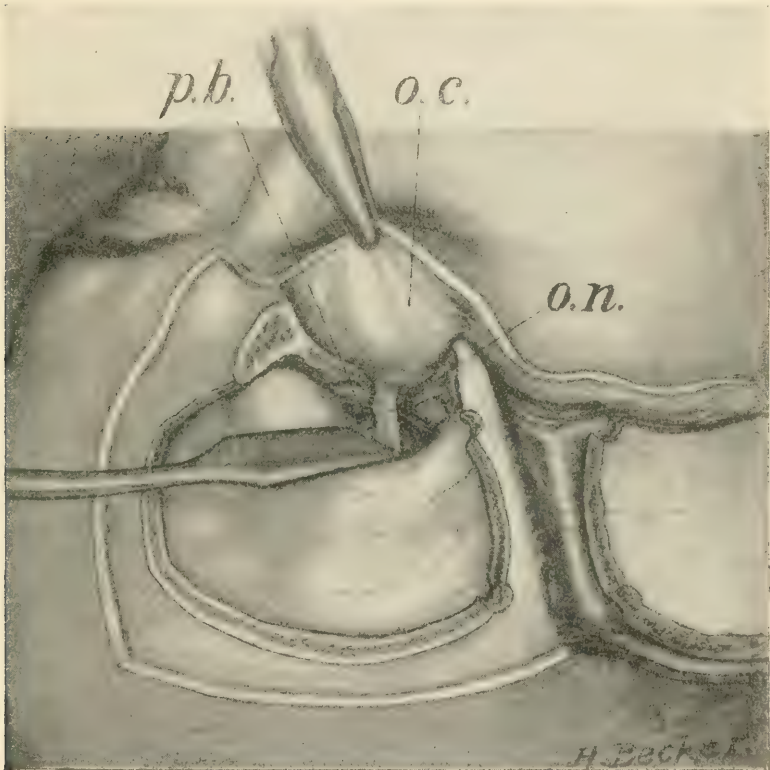


FIG. 4.—Drawing with the head in the Rose position after the supra-orbital ridge has been resected and what remains of the roof of the orbit removed, the frontal lobe elevated with a retractor, the orbital contents displaced downward, exposing the optic nerve, and immediately to the left of it the pituitary body.

to be replaced (see Fig. 3). The remainder of the orbital roof is then rongeured away down to the optic foramen, the frontal lobe elevated by an assistant, and the orbital contents drawn gently downward (see Fig. 4). A short incision in the dura is then all that is necessary to afford an adequate exposure of the sella turcica and its contents. I have found the operation devoid of any serious difficulties on every occasion, and each time have obtained a splendid view of the hypophyseal region. The exposure by the above technique is much freer, as

greater elevation of the frontal lobe is possible in conjunction with the reflection of an osteoplastic flap, and the fragment of bone resected is smaller than that removed by McArthur. This is a rather important point, as the smaller the fragment, the less likely is necrosis to occur when the bone is replaced (see Fig. 5).

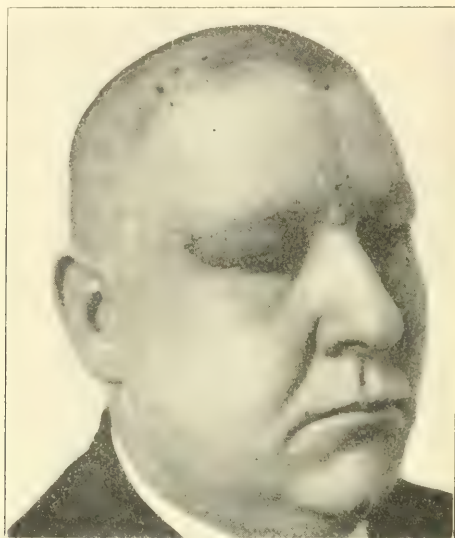


FIG. 5.—Photograph of patient taken two weeks after operation by the author's transfrontal method of approaching the sella turcica.

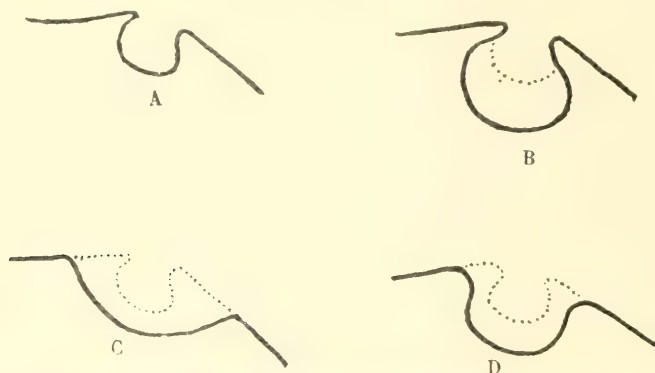


FIG. 6.—Normal sella turcica and the three possible enlargements of the sella according to Schloffer: *A*, Normal sella turcica; *B*, orifice normal with deepened base; *C*, orifice enlarged and shallow sella, denoting intracerebral development of tumor; *D*, enlargement of sella turcica in both directions.

The inevitable risk of infection from the mucous membrane, which always accompanies the transphenoidal procedures and the contracted avenue through which one must approach the pituitary body have prejudiced me very strongly in favor of the intracranial method, and

especially the infrafrontal route just described. At this juncture in the development of surgery of the hypophysis, it is still difficult to foretell what is going to be the operation of choice in the future, but I certainly feel that careful consideration should be given this method by which the possibility of infection is decreased and the avenue of approach made much less contracted. A study of the pathology of the gland makes it patent, however, that no one route is appropriate in all cases. The contour of the sella, as portrayed by the *x*-ray picture, has become the determining factor in the selection of the most advantageous method of approach. Whenever the tumor can be approached from the front, that is when the radiograph shows a sella which is deepened and encroaching on the sphenoidal cells with a narrow orifice, one of the transphenoidal routes should be chosen, as access to the gland from above is very difficult in these cases (see Fig. 6). On the other hand, when the orifice of the sella is very much enlarged, it is evident that the lesion has developed chiefly toward the brain, in which cases one of the intracranial methods must be chosen, as such growths could not be removed by the transphenoidal route. Toupet¹ feels that no operation can do much good in these cases. He, however, brings out some very interesting facts by showing that, out of 14 deaths following a transphenoidal intervention, autopsy showed that the tumor had encroached upon the intracranial space. It is not improbable that the outcome in these cases might have been quite different had the intracranial method been applied. In cases in which the glandular symptoms are present, but caused by a parhypophyseal tumor rather than by a primary lesion of the pituitary, the transphenoidal method would be entirely useless, while some such growths might be reached by the intracranial route.

HISTOLOGY. Very little attention has been paid to the histological structure of the hypophysis until recently. Toupet² has collected 56 cases, among which he found 8 cases of cysts. In 28 of the 56 cases the histological nature of the hypophysis was indicated as follows:

Normal hypophyseal tissue	2
Glandular hyperplasia	1
Benign tumor	1
Adenoma	5
Chromophile cells	1
Papillary	1
Malignant	4
Malignant tumor	2
Epithelioma	2
Epithelioma with chromophobe cells	1
Epithelioma, cylindric	1
Congenital epithelioma	1
Sarcoma or carcinoma	1
Carcinoma	2
Sarcoma	3

¹ *Revue de Chir.*, 1912, xxxii, No. 6.

² *Ibid.*, No. 6.

PROGNOSIS. The results following operations for pituitary disorders have been exceedingly encouraging, especially when one considers that in most instances only a partial removal of the pituitary lesion has been possible, and that here the surgeon is dealing with what has been considered, until very recently, one of the most inaccessible parts of the brain. One certainly cannot help taking a very sanguine attitude after looking over the record of the first 86 radical operations reported¹ for the relief of pituitary disorders. In the 86 cases which I have collected, I find that 53, or 61.5 per cent., have been greatly improved by the operation; in only 11 cases, or 12.7 per cent., was there no improvement. The mortality, 22, or 25.5 per cent., is still high, only as high, however, as it was not many years ago in operations on the Gasserian ganglion.

In a collection of 53 cases made by Hirsch, he finds 32 recoveries and 21 deaths, giving a mortality of 39.6 per cent. Hirsch² himself has operated twelve times for all varieties of hypophysial symptoms, with two deaths.

Von Eiselsberg³ has had 4 deaths due to meningitis in his 14 operations.

Toupet's⁴ collection of 54 cases of extracranial operations with a mortality of 38.8 per cent. is noteworthy. The causes of death given in 14 operations were as follows:

	Cases.
Meningitis	3
Abscess in remainder of tumor	1
Pneumonia	2
Hemorrhage	2
Hydrocephalus	2
Cardiac collapse	1
Diabetic coma	1
Suppurative parotid	1
Récidive	1

Toupet also makes a comparison of the mortality in the various symptoms-complex, showing that in 22 cases of acromegaly there were 11 deaths, or a mortality of 50 per cent., while of 6 cases of dystrophia-adiposo genitalis, there were only 2 deaths, making the mortality only 33 per cent., and, among 17 cases without syndrome, the mortality was 29.4 per cent. The results which were noted 23 times in Toupet's collection were as follows: 3, very much improved; 8, improved; 1, not improved.

Though these results may not be brilliant, they certainly compare

¹ Proceedings of the Pennsylvania State Medical Society, September, 1912.

² Berl. klin. Woch., 1911, xlviii, 1933.

³ Wien. klin. Woch., 1912, xxv, 183.

⁴ Revue de Chirurgie, 1912, xxxii, No. 6.

favorably with the first five years of surgical intervention in any new field, and prove that pituitary disorders are amenable to surgical therapy. Surgery, therefore, holds out the one ray of hope to many otherwise hopeless conditions, for the very serious troubles which follow perverted function of the gland make the prognosis for hypophysial lesions very grave, the average length of survival being one to four years, when the lesion is left to itself. Van Gehuchten feels that, in all cases, operation is indicated, once the diagnosis of tumor of the hypophysis is made, as the extirpation of benign tumors is followed by good results, and even in certain cases of malignant tumors there is an amelioration of the symptoms, where death would otherwise be inevitable.

Trigeminal Neuralgia. THE TREATMENT OF TRIGEMINAL NEURALGIA BY ALCOHOLIC INJECTIONS. This subject has assumed a degree of importance which was not anticipated when Schlosser first recommended its adoption. So many observations have been made that we are now in a position to give a very fair and impartial review of the immediate and ultimate effects. There is no doubt, of course, but that the injection, when properly given, affords almost instantaneous relief, and the patient is usually surprised at the simplicity of the procedure which affords him absolute freedom from torture, when all other remedies short of operation have failed.

Compared with the peripheral operation, such as avulsion by the Thiersch method, alcoholic injections are equally efficacious, in so far as immediate relief is concerned, and while recurrence in the latter is the rule rather than the exception, the percentage of recurrences after avulsion is so high that I have about concluded that the alcoholic injection must be given precedence to the peripheral operation. While my percentage of recurrence is not as high, Dollinger¹ found that, in 14 cases in which he had resected twenty-one branches of the trigeminus, only one remained free from recurrence.

Should the alcoholic injection supersede the operation on the ganglion or its sensory root? I can best answer this question by outlining my own practice. When the alcoholic injection has not been tried, I invariably give it a trial, and the injections are repeated as often as may be necessary. When, in my own practice or that of others, the injections become ineffectual or the patient tires of the recurrence and dreads the return of another attack, and when the patient is a good operative risk, I invariably recommend the central operation. This practice conforms to that of Patrick, who advised the alcoholic treatment "for the very old, the very feeble, and for those with grave organic disease. But when the sufferer from *tic douloureux* is young and vigorous with the prospect of living many years, it would be better for him to have the radical operation done at once by a first-

¹ Deutsch. med. Woch., 1912, xxxviii, No. 7.

class man, as in all probability eventually he will come to it." In Patrick's¹ experience with alcoholic injections for trifacial neuralgia, in the case of the middle branch about 25 per cent. have been misses, about 42 per cent. partially successful, and 33 per cent. good. Of those for the inferior branch about 27 per cent. have been misses, 45 per cent. partial successes, and 28 per cent. good. In only about 18 per cent. could the first attempt at either branch be considered successful.

While I am not performing quite as many radical operations as I did a few years ago, I still find suitable cases in my practice, and in this respect my experience differs from that of Dollinger.² Since he has studied the effects of alcoholic injections, especially for the last two years, he has not had occasion to extirpate the Gasserian ganglion, although he believes that in certain instances, especially when all three divisions are involved, when there have been frequent recurrences, and when the age and strength of the patient permits, the more formidable operation is justifiable. In his operations on the Gasserian ganglion, of which he has performed 24, he was obliged in two instances to interrupt the operation on account of severe hemorrhage. One patient died of cerebral symptoms, and 21 cases were entirely relieved. Latterly he has abandoned the extirpation of the ganglion and practised avulsion of the sensory root, which procedure he finds, as I have frequently called attention to, lessens the amount of bleeding and, while equally as formidable as the extirpation of the ganglion, is a much simpler operation. While his results have been most creditable as far as the mortality was concerned, losing only 1 case in 25, Dollinger advocates the use of the alcoholic injections before operative procedure is considered. He has done this in all his 43 cases. In the injection of the second division the results were not uniformly successful, as the report was made a comparatively short time after injection. In 4 cases, one, three, three, and seven months respectively, had elapsed without recurrence, and, in 4 others, pain was not entirely relieved. Following injection of the third division, there was one with complete freedom from pain for a considerable time (period not mentioned), and in one case three injections failed to give any relief.

Writing from the Psycho-Neurological Institute at St. Petersburg, Pussep³ calls attention to the advantages of the physiological extirpation or avulsion of the sensory root over the actual extirpation of the ganglion, and refers to the experience of Rasumowski, in which pain was entirely relieved without any serious disturbance to the eye. In speaking of the technique, he calls attention to the advantages, which are self-evident, of having some form of artificial illumination.

¹ *Journal of the American Medical Association*, 1912, lviii, No. 3.

² *Deutsch. med. Woch.*, 1912, xxxviii, No. 7.

³ *Zeitschr. f. d. ges. Neurol. u. Psychiat.*, 1911-12 viii, p. 81.

From the clinical standpoint, the recurrence of pain after injection is a well-established fact. A number of observations have been made in the laboratory as to the functional and histological effects of the injection, and to them may be added those of May,¹ who summed up his results as follows:

Alcohol, injected into the trunk of a peripheral nerve, produces a more or less complete local necrosis of the nerve at the point of injection. The change is not an "ascending" one, the nerve above the point of injection remaining normal; the cells of origin of the fibers may show some degree of chromatolysis, but do not exhibit signs of permanent injury. The conditions produced by such injection are more favorable to regeneration than those resulting from simple section without suture. The anatomical continuity of the nerve trunk favors rapid regeneration, though this is to some extent retarded by the fibrosis which occurs to a greater or less extent in every case of alcohol injection.

A feature of added interest in the application of alcoholic injections to the treatment of neuralgia is the attempts recently made to influence the course of the disease by injections directly into the ganglion. *A priori*, one would not expect these injections to be of more enduring effect than the injections of the peripheral branches, and this deduction has been borne out by the investigations of May,² who found that it was apparently impossible by a single injection of alcohol to produce complete necrosis of the Gasserian ganglion, its dense texture preventing complete infiltration. The alcohol tends to find its way under the sheath of the ganglion toward the proximal root, which is affected to a greater degree than the actual ganglionic cells.

Wilfred Harris³ lately reported several cases of trifacial neuralgia, treated by ganglionic injections of alcohol, and stated that there was clinical evidence of almost complete destruction of the ganglion as a result of a single injection. In not one of May's experiments was there anything approaching this result; in each case a very large number of cells remained histologically normal. Sections of the ganglion showed definite changes, but the effect on the fibers seemed relatively more marked than on the cells. Thus, in Experiment 5 the middle division was largely degenerated, in Experiment 6 the middle and inferior divisions, and in Experiment 7 chiefly the middle division.

A very striking feature in each of these was the considerable amount of degeneration found in the spinal root of the trigeminal. This was quite out of proportion to the extent of cell destruction in the ganglion. In Experiment 6 the root was practically completely degenerated, while the majority of cells appear to have escaped. The explanation

¹ British Medical Journal, August 31, 1912.

² Loc. cit.

³ Lancet, 1912, i, p. 218.

of this fact is not obvious at first sight. Experiments 1 to 4 in the group of injections into the infraorbital nerve show that damage to the axones peripheral to the cells does not produce retrograde degeneration in the central processes constituting the spinal root. Hence, in the absence of complete cell destruction, we are driven to the conclusion that the alcohol must have passed centrally and reached the proximal root of the nerve without actually infiltrating the whole ganglion. In other words, it must tend to creep along the superficial parts of the ganglion under its fibrous sheath, apparently following the line of least resistance. In order to investigate this manner of spread more clearly, it was decided to repeat the experiment on a larger animal in which the structures approximated more closely in size those of man, and a nearly full-grown young goat was selected for the purpose.

The alcohol, when injected into the ganglion, spread centrally to the proximal root without destroying the larger number of cells *en route*. The amount of "central" degeneration was undoubtedly far in excess of the sum total in the three peripheral trunks, and disproportionate to the cell destruction.

This suggested to May the interesting question as to whether fibers of the sensory root are capable of regeneration. It is usually held that such is not the case, that fibers in the central nervous system, even those of exogenous origin, do not undergo complete regeneration. If this is true, then, from the therapeutic point of view a complete section, mechanical or chemical, of the root of the trigeminal nerve proximal to its ganglion, should be equivalent to removal of the Gasserian ganglion itself. May at present is engaged in working this problem out with the aid of alcohol injections, although he is laboring under an erroneous impression when he believes that "clinical experience is against the view that simple section of the trigeminal nerve proximal to the ganglion is as effective as removal of the latter."

Regional Anesthesia in the Trigeminal Territory. Particularly in Germany local anesthesia is being utilized as a substitute for general anesthesia with increasing frequency, and for a great variety of lesions. Several years ago I referred to the possibility of carrying out the operation on the Gasserian ganglion by injecting the third division of the trigeminus, and, while this has not proved feasible, I have been able to shorten the period of general anesthesia very considerably by injecting the ganglion with alcohol as soon as it is reached. This effectively anesthetizes the entire field, and, by the time the operation is completed, the patient has recovered from the effects of the general anesthetic. Within the past year, several techniques have been suggested for injection of the trigeminus and the Gasserian ganglion, not only for the relief of neuralgia, but also for the performance of operations within the territory of the trigeminal distribution.

Thus we find that Braun¹ advocates this form of anesthesia especially in operations for frontal sinus disease, in operations for carcinoma of the nose and tongue, resection of the upper jaw, removal of the floor of the mouth and tonsils, as well as operations on the Gasserian ganglion. The field is rendered not only completely anesthetic, but practically bloodless, and lung complications are extremely rare. The nerve is blocked by injecting the special branch or branches involved with 5 c.c. of a 1 per cent. solution of novocaine suprarenin, and, as an extra precaution he recommends that the external site of the operation also be anesthetized, a 0.5 per cent. solution being used for this purpose. His technique for injecting the various branches is as follows:

The first division and its branches are easily reached by deep injections through the back part of the orbit in those places where the orbital wall has an even, not concave, surface on which the point of a graduated needle can be traced outside the muscular covering of the eyeball. At other points where the needle must leave its course along the bone, injury to the eyeball cannot surely be avoided. The lateral and upper median walls are therefore the most suitable places. The injection through the lateral wall should be made from a point over the outer canthus of the eye. The graduated needle is introduced 4.5 to 5 cm., care being taken all the time not to let the needle leave the bone. At a depth of about 4.5 cm. the needle crosses the superior orbital fissure and the injection is given. The point for the median injection is about the breadth of a finger over the inner canthus of the eye. The lateral injection interrupts the *nervi frontalis* and *lacrymalis*, while with the median, the *nervus nasociliaris* and the two ethmoidal nerves are blocked. In order to reach the second division, the needle is introduced into the pterygopalatine fossa. The needle is first introduced at a point just behind the lower angle of the malar bone, from which it is gently pushed inward and upward, its point passing through the masseter and reaching the tuber maxillæ along whose upper surface the needle is slowly passed. The needle is then directed more toward the middle of the zygomatic arch and, finally, when it reaches the pterygopalatine fossa at a depth of 5 to 6 cm., the injection is given. Braun has found that the third division is most easily reached through the mouth at the junction of the lingual and inferior dental nerves. The needle is held on a level with the lower jaw. Its point is introduced just behind the last lower molar and inserted 2 to $2\frac{1}{2}$ cm.

While, of course, this method of Braun's is no doubt effective in securing anesthesia in the distribution of the several branches, we cannot indorse his recommendations to inject the first division. The proximity of the optic nerve is such that the procedure must always be attended with a risk which is by no means imaginary, and so far as I know, those who have had most experience in this country with the

¹ Deutsch. Zeitschr. f. Chir., 1911, xvi, No. 4-6.

alcoholic injections have practically abandoned the earlier attempt to influence pain in the distribution of the first division, except in so far as they can do so by injecting its peripheral branches.

Instead of injecting the divisions of the trigeminal nerve separately, according to the technique advocated by Braun and Offerhaus, Härtel¹ recommends an injection directly into the Gasserian ganglion itself. The latter technique, Härtel feels, is much simpler, the amount of anesthetic is less, as he uses only from 0.5 to 1.5 c.c. of a 2 per cent. novocaine-suprarenin solution, and the anesthesia is immediate and lasts from one to two hours, according to the size of the dose. He uses a fine steel cannula, and approaches the ganglion through the foramen ovale. Härtel has found that a straight line passing from the foramen ovale to the middle of the depression containing the Gasserian ganglion coincides with a point midway between the ascending portion of the lower jaw and the posterior border of the maxillary tuberosity. The distance from the cheek to the foramen ovale is about 5 to 6 cm. (extracranially), and from this point to the trigeminal depression is generally 1.9 cm. (intracranially). If this general direction is strictly adhered to, it is impossible to deviate from the proper course or to injure in any way the cavernous sinus, the brain above, or the carotid below. He has used this method in six cases, injecting from 0.5 to 5 c.c. of a 2 per cent. solution. There were practically no variations of pulse, and all patients bore the anesthetic well, with the exception of one case in which the dose was too large and vomiting followed. The 6 cases included 2 cases of trigeminal neuralgia of the second branch in which the injections were used for therapeutic purposes only, without operation, 1 case of orbital tumor, 1 case of empyema of the antrum of Highmore, and 2 in which teeth were extracted from both jaws.

Krause² was able under local anesthesia to remove the ganglion from a patient, aged seventy-two years, with marked arteriosclerosis. The result was so satisfactory that Krause feels very strongly that this method should be employed in all such cases. A subcutaneous injection of 0.0005 per cent. scopolamine and 0.02 per cent. pantopon was given three-quarters of an hour before the operation. Then 5 c.c. of novocaine were injected, first subcutaneously and then subperiosteally at the posterior and anterior ends of the zygomatic arch, and the same quantity at the upper and lower margins. In like manner the entire temporal region, including the muscles and periosteum of the temporal fossa, was injected from a point over the middle of the zygomatic arch with two injections of 5 and 11 c.c. When the meningeal artery had been exposed, an injection of 2 c.c. was made into the dural membrane toward the median line and backward. The pulse remained regular throughout, and the patient stated at the conclusion of the operation that she had felt nothing.

¹ Zentralbl. f. Chir., 1912, xxxix, No. 21.

² Ibid., No. 12.

Epilepsy. In a symposium on epilepsy before the College of Physicians of Philadelphia,¹ I presented my experience in 63 cases in my practice, and called attention especially to the multiplicity of lesions which one sees on the operating table, and the necessity of taking these individually into consideration when deciding upon the mode of operative procedure, and to the fact that a more or less definite pathological lesion was found in so large a percentage of my cases.

Furthermore, the multiplicity of the lesions at once suggests the intricacy of the problem with which we are dealing, and the character of the lesions foretells the difficulty of devising means for their relief by surgical intervention. I do not want to dwell too much upon the pathogenesis, and yet it seems to me so vital to an intelligent discussion of the subject that one can ill afford not to give it a very conspicuous place. Of the various lesions, a considerable number, almost half, were classified as pachymeningitis or edema. As to the latter, we find in the subarachnoid spaces an unusual amount of cerebrospinal fluid, sometimes clear and sometimes cloudy like barley water, due to the presence of particles of lymph; upon pricking the pia and arachnoid with the point of the knife, an unusual quantity of fluid escapes and may continue to drain for some time after the operation. I acknowledge the possible source of error in determining with precision at the operation whether the amount of fluid in the subarachnoid spaces is beyond the limitations of the normal, since a certain amount of fluid is present in these spaces under normal conditions. But there is no doubt in my mind, and this observation has been confirmed by many others, that in a not inconsiderable number there is a large enough collection of fluid to warrant the condition being regarded as different from what we are accustomed to see in the cortex of the normal brain. In a recent article, Alexander² lays great emphasis upon edema as an important causative factor in the instability of the cortical cells to which epileptic seizures are ascribed. In 20 successive operations, edema of the pia-arachnoid was recorded as present.

In addition to diffuse edema, I have indicated, under the term pachymeningitis, an opaque appearance of the membranes mostly confined to the course of the vessels in the sulci between the convolutions, but occasionally more diffuse, covering a portion of one or more convolutions. This opacity, I take it, is due to the deposition of lymph or to an exudate of traumatic or inflammatory origin, as in not a few instances there has been a history of trauma or of some infectious disease, particularly scarlet fever. Whatever the origin or the nature, this pathological picture is often seen, sometimes alone, sometimes with adhesions, and sometimes with edema. I have made no reference to the microscopic pathology, as there has been no oppor-

¹ *Therapeutic Gazette*, March, 1911.

² *Lancet*, September 30, 1911.

tunity to make a histological study of the cortex in our clinical experience. Such changes as may be the result of congenital defects, or of degenerative and inflammatory processes, have been found by those who have made systematic examinations of epileptic brains.

Of importance greater than the performance of the operation is the selection of cases. At the present time, I decline to operate on epileptic subjects unless the type of the disease conforms to one of the following four groups: (*a*) Traumatic epilepsy with external evidence of an injury; (*b*) traumatic epilepsy without external evidence of an injury when the nature of the attacks or the symptoms immediately following the injury indicate the seat of the lesion; (*c*) all forms of Jacksonian epilepsy of whatever origin; (*d*) general epilepsy where the suggestion of a focal lesion may be found by a careful physical examination before or after the attacks in some disturbance of motion, sensation, or reflexes.

The operative procedure must be adapted to the character of the lesion: (*a*) Cranial defects should be repaired; (*b*) focal lesions, such as cysts, tumors, etc., should be removed; (*c*) edema, a very common lesion, calls for some method of drainage; (*d*) in Jacksonian cases without lesion, the cortical centre should be excised; (*e*) in idiopathic epilepsy without focal symptoms or lesions, Kocher's decompression deserves consideration.

The value or the justification of an operation should not be measured by the percentage of absolute cures alone. To reduce the attacks in severity and in frequency from one in several days or weeks to one in several months or years, or even to be able to arrest the progress of the disease, is a matter of no small consequence and should not be lost sight of in the final analysis. In a series of 25 cases that I had operated upon more than three years ago, the results in 28 per cent. were more than satisfactory, in that the patients were markedly improved or virtually recovered.

Doberer¹ applied what he terms as the "Unstülpungsmethode" (previously described by Krause) in 5 cases of epilepsy, with success in 4 and transient relief in 1. (As the first operation was performed only in October, 1911, it is improper to consider the effects of the operation or the end-results until at least three years have elapsed.) The operation consists in reflecting a five-sided osteoplastic flap from the motor region, and raising the dura in which a crucial incision is made. The four triangular flaps thus formed are folded back flat, worked into the space between the dura and the skull, and the bone flap replaced. This procedure is based on the same principle as Winkelmann's radical operation for hydrocele, which consisted in inverting the wall of the sac so that its contents might be absorbed by the subcutaneous tissues. Doberer conceived the idea that in certain cases

¹ Wien. klin. Woch., 1912, xxv, No. 9.

of epilepsy in which there was a great amount of fluid in the subdural space, this fluid might be taken up and carried away by the venæ diploicæ if the dural flaps were inverted. These veins pass through the diploe of the skull and empty, partly into the sinus duræ matris, and partly into the outer cranial veins.

Meningitis. We have yet much to learn of the treatment of meningitis. I am not referring to syphilitic meningitis or to epidemic cerebrospinal meningitis, but to the group in which the infection is due to the disease coincident with trauma, or secondary, as most of them are, to pyogenic infections originating in the middle ear. It is always refreshing and stimulating to review the activities of those who are battling with these problems, and it is with pleasure that I call attention to the research of Kopetzky and Haynes,¹ on the nature, cause, diagnosis, and principles of surgical relief. Apart from the conclusions to which the authors have arrived, this monograph deserves the attention and critical study of all who are interested in this problem. In its thoroughness, in the logical sequence, in which the individual research problems are presented, in the upbuilding of a theory, each step of which is founded upon sound, scientific deductions, and in the final application of this theory to the treatment of the disease by an appropriate and novel operative procedure, this research may well stand as an example to those who have aspirations in the line of experimental surgery. The first part of the work, contributed by Kopetzky, deals with two problems—the problem of intracranial tension, and the biochemistry of the processes involved in the action of the organisms upon the brain tissue and its coverings. A considerable amount of work was done on the effects of increased intracranial tension which in all essentials is confirmatory of the views generally entertained, but the authors wish to emphasize the point that the dominating symptoms of meningitis are the symptoms of an increase in the tension of the cerebrospinal fluid, with functional disturbances of the vagus, the vasomotor, and the respiratory centres, modified, of course, but such factors as are the direct effect of the action of the microorganism upon the brain tissue. While an intensely interesting series of observations were made in the study of brain-tissue edema, and on the question of the acidosis in the tissues and estimations of degree of acidity of the cerebrospinal fluid, the most important of the chemical findings from the standpoint of the practical application, was the disappearance from the cerebrospinal fluid of the available carbohydrate as a result of the infection of the brain fluids and tissues. The disappearance of this copper-reducing body is probably the earliest sign of meningitis, and affords a means of diagnosis in cases of suspected meningeal infection, which clearly differentiates meningitis from all other diseases whose clinical

¹ Meningitis. Presented at the annual meeting of the American Laryngological, Rhinological, and Otological Society, May 14, 1912.

pictures give symptoms habitually referred to the meninges, as, for example, the meningeal symptoms of pneumonia or typhoid fever.

Of the two factors in meningitis, that of intracranial tension and that dependent on the growth of bacteria and on the decomposition products thrown into the circulation from the disintegration of nervous tissue, the former, more often than the latter, determines, in the opinion of the authors, the outcome in a given case. From this, the authors conclude, that *any procedure which places the control of the intracranial pressure within our grasp will be the logical surgical remedy for this condition*. This is the crux of their argument, and naturally will be the principal point of attack. On this basis, Haynes devised his operation with a view toward establishing the most effective drainage of the cerebrospinal space. The best site at which to establish drainage, Haynes maintains, is at the cisterna magna in the posterior fossa. An incision is made in the median line from the occipital protuberance to the spinous process of the axis and carried down to the occipital bone and posterior arch of the atlas. The periosteum is now stripped from the occipital bone, taking with it the inner portions of the origin of the attached muscles, and the occipital bone is bared for about a distance of one and one-half to two inches vertically and an inch transversely, at the foramen magnum. The De Vilbiss trephine (three-eighths of an inch) is applied in the midline, and about one inch from the margin of the foramen magnum, and the button of bone removed. With the special dural separations the dura is loosened from the bone and the De Vilbiss bone-cutter used to make two lines of incisions or grooves through the bone into the foramen magnum. The wedge of bone, cut loose, is about half an inch wide at the foramen magnum, and a little less at the upper border. Of course the size may vary for each individual and according to complications. The detachment of the bone-button is carefully completed and it is removed. The occipital sinus (or sinuses) will be seen, if present, showing a blue color through the dura. If the sinus is double, the dura should be incised between them. If single, it should be tied at the upper part and just beyond its bifurcation into the marginal sinuses.

In dividing the dura, first make a very tiny incision into it, using the fine curved bistoury for this purpose. This is necessary, for should the arachnoid be so closely applied to the dura as to be divided with it we need to prevent a too sudden escape of the cerebrospinal fluid. Should it be found that the dura has been severed alone, the incision in it should be carried up and down to the limits of the opening in the bone.

The arachnoid will now bulge into the field, unless it has been divided with the dura. The amount of its bulging will give some idea of the degree of intracranial pressure. The arachnoid is slightly nicked in the middle line and the cerebrospinal fluid allowed to escape, a speci-

men being taken for laboratory examination. While it escapes slowly a careful watch is maintained upon the blood pressure, pulse, and respirations by one especially detailed for this purpose. Syncope may be prevented or lessened by arresting for a moment the flow of the fluid by gentle pressure of the finger. As soon as the excess of fluid has escaped, open the arachnoid for the full extent of the dural opening. The condition in the cerebellomedullary angle should be very carefully investigated. Should there be an exudate about the parts, the lobes of the cerebellum should be raised and separated by the "pushers" provided for this purpose, and the patency of the foramen of Majendie assured. It may be necessary to enlarge the opening in the occipital bone. This is easily done by the ordinary rongeurs or by the bone-punch devised by the writer. A small wick of rubber or gutta-percha tissue is placed within the margins of the dura and arachnoid and left protruding from the wound. The muscles are replaced and held together by two or three plain gut sutures (interrupted). The skin is closed above and below the drain with silkworm gut, interrupted sutures. Voluminous dressings are applied, sufficiently thick to fill out the normal hollow between the head and neck. The patient is handled with care, remembering that the brain stem no longer has its protecting cushion of fluid. The entire operation takes from fifteen to thirty minutes.

The advantages claimed for the operation are: (1) That it opens the cisterna magna at the largest and most favorable spot for drainage; (2) that intracranial pressure is relieved, and blood restored to the vital centres; (3) that there is no danger of cerebellar hernia or corking of the foramen magnum; (4) that adhesions at the foramen of Majendie can readily be separated; (5) that by opening the foramen of Majendie, hydrocephalus is forestalled; (6) that the operation is not difficult, is comparatively bloodless, and can be performed in from fifteen to thirty minutes.

It is unfortunate that the 3 cases which Haynes operated upon by his method did not recover. That they may have been too far advanced at the time of operation may be offered as an explanation of the fatalities, nevertheless the fact that the arguments for the operation are unsupported by the recovery of a single case detracts considerably from the importance of the contribution. I would not condemn the operation on this negative evidence, but, on the contrary, hope that it may be given a fair trial in a considerable number of suitable cases. So otherwise hopeless is the condition with which we are contending, so high its mortality, that we are fully justified in resorting to any measure which, on theoretical grounds at least, has many points in its favor. I cannot help but feel a certain amount of skepticism as to the efficacy of any procedure which has for its fundamental principle adequate drainage of the subarachnoid space. I do not question for a

moment the claim that the best site at which to drain the posterior fossa, and the best site at which to establish decompression of the medullary centres is precisely as Haynes has indicated. But there is serious doubt in my mind whether an opening in the cisterna magna will insure drainage of the ventricles on the one hand, and the sub-arachnoid space over the cortex of the cerebral hemispheres on the other. This is really the crux of the whole situation, and the truth or fallacy of these disputed points can be determined only by an extended trial of the operation as devised by Haynes. Another point which will come up for discussion sooner or later is the propriety of resorting to so formidable a procedure solely on the disappearance of the copper-reducing substance from the cerebrospinal fluid, that is, presumably before any other symptoms justify the diagnosis of meningitis with any degree of certainty. These, and other minor matters, may be left in abeyance until further contributions may open up the subject again for discussion.

Experimental Tuberculous Meningitis. While the mechanism of the natural cure has not as yet been fully worked out, it would nevertheless appear that phagocytic cells play an important part in it. It, therefore, becomes of interest to determine the extent of the action of the body phagocytes under controllable experimental conditions. The leukocytes are the phagocytic cells most readily obtained for experimental purposes.

Kling has shown that leukocytes, injected simultaneously with tubercle bacilli, have the power of decreasing the pathogenic properties of these microorganisms. To Opie, however, belongs the credit of a painstaking and systematic study of the effects of injected leukocytes upon a tuberculous lesion already developed. Opie inoculated the pleural cavity of dogs with tubercle bacilli, and found that leukocytes, brought into contact with the tuberculous tissue thus produced, made very striking alterations in it. The flat plaques of tuberculous tissue upon the pleura of the control animals, were almost absent in the treated dogs. The pleura was sometimes returned even to the delicate translucent appearance observed in the normal animal. The masses of tuberculous tissue in the mediastinum and in the subpericardial membranes were also smaller after the injections, and there were fewer metastatic lesions in the extrathoracic organs.

The work of Manwaring¹ embodied in this paper is part of the study of the experimental therapeutics of meningeal infections, which is being carried out at the Rockefeller Institute. The cerebrospinal membranes differ from the true serous membranes in that they are almost impervious to the blood proteids, and normally receive little or no protective substance from this source, and few, if any, leukocytes. The meningeal cavity is, therefore, always in an inferior condition of

¹ Journal of Experimental Medicine, 1912, xv, No. 1.

defence against infection. The method of lumbar puncture, however, provides a ready means of bringing healing substances into direct contact with pathological processes existing within these membranes, and has made possible a study of the local therapeutics of diseases of this surface. The experiments were made on dogs, and consisted, (1) in producing a tuberculous infection of the meninges, and (2) in attempting to control the lesion by the local injection of leukocytes. Subdural inoculation of tubercle bacilli of established virulence for guinea-pigs and rabbits, produces in the dog a tuberculous meningitis, followed by paralysis and death. When suspensions of canine leukocytes are injected subdurally, following such inoculations there occurs uniformly a delay in the development of the paralysis and a prolongation of the life of the treated animal. In dogs inoculated with small doses of tubercle bacilli of low virulence, the development of paralysis has been prevented by this means for periods of seven months (up to present date), while the untreated animals injected with the same cultures have all developed paralytic symptoms within a period of about four weeks.

Plastic Operations on the Dura. In 1910, v. Saar reviewed the various methods, to date, of repairing defects in the dura, consisting of the alloplastic technique, in which gold or silver foil, platinum, etc., are used; the heteroplastic technique, by which the defect is repaired by means of a hernial sac, fresh or prepared peritoneum, or the covering of a hydrocele; and, finally, the autoplasmic method, which comprises the use of periosteum, skin, or fascia. Brüning,¹ in a case of Jacksonian epilepsy following a complicated fracture of the skull, after he had applied a sheet of paraffin to prevent the formation of adhesions between the dura and the brain, conceived the idea of splitting the dura into two layers and using one to repair the defect. He found that this splitting was accomplished very easily—the upper sheet being thick, and containing many bloodvessels, while the lower one was very thin and composed mostly of bands of tissue. An attempt to establish the efficacy of this procedure through experiments on animals, failed because in most instances the dura was too delicate or too adherent to the inner surface of the skull to permit of splitting. It was tried with success on the cadaver, and he reports 4 cases in which he has used it on patients—with remarkable success in 2 cases, 1 case of epilepsy, and 1 of an after decompression for fracture. The technique is as follows: Parallel to the length of the dural defect to be covered, a horizontal incision is made which separates the dura into two layers the distance of the line of incision from the defect being equal to the breadth of the defect plus 0.75 cm. From the end of the original incision, another is made extending to 0.5 cm. of the defect. By loosening the edges of the upper flap, this sheet of the dura is easily raised.

¹ Deutsch. Zeitschr. f. Chir., 1912, cxii, No. 3-4.

The upper dural flap is then turned at its base so that its upper surface lies flat against the brain, covering the defect. There is little danger of serious hemorrhage, if care is taken to avoid the Pacchionian granulations, and, if the flap is not too small and broad enough at its base, there is little possibility of its absorption. The inner layer of dura, which remains in its original position, Brünig feels, will receive sufficient nourishment through diffusion.

I have never resorted to the method of Brünig, but I should have thought, from my experience in handling the dura, that it was not as easy to separate the layers as the author would have us believe. As a matter of fact, in most instances, and especially when there are adhesions between the dura and arachnoid, I do not hesitate to remove the affected portion, and have not found it necessary to replace the dura with any foreign membrane. The dura really serves only as a protective membrane, and when, as in most instances, the osteoplastic flap is replaced, the brain is well protected and the dura can be dispensed with. Should there be any reason, however, for replacing it, the use of the fascial flap will be quite satisfactory.

Kirschner and v. Saar conceived the idea of repairing defects in the dura in this manner, and tried it successfully on animals; Körte also used it successfully in 2 cases of epilepsy. Denk¹ gives an example of the efficacy of this procedure, in the case of an epileptic from whom an endothelioma of the dura was removed. There was complete cessation of the attacks for nine months after the operation, when the attacks again became so severe that another operation was undertaken and a second tumor removed. The defect in the dura this time required a fascial graft measuring about 4 by 5 cm. The wound healed perfectly, and the patient reported to be in good health two months after the second operation. The technique used by Denk is very simple. He prefers to take the graft from the thigh, and makes a linear incision on the outer side of the thigh, thus exposing the fascia lata, the fat of the latter being carefully removed. A piece of fascia corresponding to the size of the dural defect is then removed and, with the muscular surface toward the brain, it is placed in the defect and fastened there securely with catgut sutures. The defect in the thigh is either closed with catgut sutures or left open, and the skin sutured over it. These wounds always heal by first intention. Denk advocates the use of fascia for closing these defects in preference to other materials, because it is always available and requires no preparation.

Other tissues have been used, such as the urinary bladder of fish (Hanel), the membrane of an egg (Freeman), the temporal muscle (Beck), and periosteal flaps (Hacker). Kocher has used the human peritoneum, and Finsterer has had satisfactory results with the sac of a hernia. What I have already said regarding the use of any foreign

¹ Archiv f. klin. Chir., 1912, xcvii, No. 2.

material applies with equal force to these. The mere cessation of attacks in Jacksonian epilepsy must not be attributed to the use of any one particular membrane. When, as in Kostic's case¹ there is a large defect in the skull, it is much more important to repair this defect than to perform a plastic operation, as he did on an adherent dura, and leave the cranial defect unrepaired.

Fractures of the Base of the Skull. The problems involved in the treatment of basal fractures has commanded our attention for a number of years, more especially since an attempt has been made by some to encourage operation in most cases. My opinion on this question will be found in *PROGRESSIVE MEDICINE*, March, 1909, page 18, and since that time accumulating clinical experience and laboratory observations have made me, if anything, a little more conservative. Briefly stated, I advise and practise operation (excluding, of course, cases of hemorrhage) only as a means of relieving intracranial tension, when, by studying the development of the clinical picture, the blood pressure, upon which too much reliance must not be placed, and the temperature record, we see the intracranial contents *gradually* being encroached upon to such a degree that there is danger of the bulbar centres being overwhelmed. It is only in very exceptional instances that I find a case which conforms to these requirements. I strongly protest against the attitude taken by Voss (*vide infra*), and believe, if generally subscribed to, it would do incalculable harm. Not only is his teaching regarding the effects of operation upon pressure fallacious, but that upon infection too. Could any better safeguard against infection be provided, when there is communication with the subarachnoid space, than the constant outflow or flushing of the channel of communication with sterile cerebrospinal fluid. Valentin's suggestions which follow are very much more sane, and in the main should generally be subscribed to.

Voss² has recently very strongly recommended operative intervention. In 1910, he came to the conclusion that in general fractures of the base of the skull should be considered suitable for operation, especially when the ear or nose are involved. Indeed, he goes so far as to say that it should be undertaken for curative reasons in cases of infection of the cranial contents from the ear or nose, just as in cases of pressure, for he feels that dangers of infection can be greatly diminished by operation. A basal fracture involving either the ear or nose is always a complicated fracture, and infection of the spaces thus opened (labyrinth or the subarachnoid space) is almost inevitable, unless a preventive operation is undertaken. Valentin³ does not agree with Voss as to the advisability of operation in all cases of basal fractures. Valentin has come to feel, through his own experience and the

¹ Wien. klin. Rundschau, xxv, p. 85.

² Verhandl. der deutsch. otol. Gesell., 1910.

³ Ibid., 1911.

statistics which he has collected, that the possibility of infection of the arachnoid space with basal fractures is not great enough to justify a preventive operation. According to Valentin, meningitis is the principal complication to be avoided by operation, for, while abscess and sinus thrombosis are often present, the latter are usually secondary complications and not caused directly by the trauma itself. In 470 cases of fractures, Brun found 32 in which meningitis was present; Phelps notes only 21 instances of meningitis out of 1000 cases, of which 14 were fractures of the base; Franke found 8 cases of meningitis in 107 basal fractures. In going over the records at the Allerheiligen-hospital at Breslau for the last ten years, Valentin found 54 cases of fracture of the base of the skull, in 4 of which meningitis was present, three times having origin in the nose or neighboring cavities, and in reviewing his autopsy statistics for the last five years, he found 45 cases of basal fractures, 34 of which reached the temporal fossæ, 5 penetrated the nose, and in 7 cases the ear and nose were involved. Eighteen of these cases died from the immediate effects of the operation, but only one was due to meningitis. Six recovered from the immediate effects of the operation, among which were two cases of sinus thrombosis. The above statistics do not make infection of the subarachnoid space as great a danger as it is usually supposed to be. Valentin feels that the frequency is not great enough to justify a preventive operation, which in some cases may increase the danger of infection.

Apart from the question of a preventive operation for infection, Valentin has come to the following conclusions:

When the labyrinth is involved in the fracture, exposure of the middle-ear cavity is not justified, though when there is a fresh suppuration of the middle ear which threatens infection of the subarachnoid space or the labyrinth, a prophylactic operation may be undertaken to provide for drainage.

In cases where there is a chronic suppuration of the middle ear before the trauma, Valentin feels that the danger is relatively slight, but wishes to wait until he has made further observations before stating definitely whether operation is justified or not in the face of these complications.

In the presence of endocranial complications, such as extradural hematoma, sinus thrombosis, and meningitis, an operation is indicated.

In fractures penetrating the ear, the same principle holds good as in cases of trauma of the membrana tympani, namely, that they heal readily when left to themselves, but when operation is undertaken infection is apt to enter in.

Still more unfavorable for operation are fractures penetrating the nose, since the danger of infection is greatly increased.

Complicated fractures of the frontal bone are to be treated as those of the vault.

With regard to fractures of the ethmoid bone, Valentin once more entirely disagrees with Voss, and discourages operation, by which the communications are unavoidably widened.

Isolated Fracture of the Sella Turcica. This very unusual fracture was discovered at autopsy by Siebert,¹ the only case of its kind to be found in the literature of the last twenty years. In the symptom-complex there was nothing to suggest any disturbance of the function of the pituitary gland. The patient, a laborer, aged sixty-two years, after a fall and blow on the forehead, became unconscious and nauseated, and presented many of the symptoms which one usually finds with a fracture of the base of the skull. In the fluid recovered by lumbar puncture on the second day, no blood was recovered, and there was no increase in pressure, but the patient was still unconscious. He developed pneumonia in the left lobe and died on the third day, and at autopsy this peculiar isolated fracture of the sella turcica was found with no other injury to the skull.

Obstetric Indentations of the Skull. The pathological and clinical study of cranial depressions in the newborn dates back only to Danyau, in 1849, and while they have been carefully studied since then, their treatment is of rather recent date. The forehead and the parietal region are the places most likely to be thus injured. These indentations are sometimes so slight that by natural processes the skull assumes its normal shape spontaneously. On the other hand, the injury is sometimes coupled with fractures so serious that unless repaired immediately, the child is likely to suffer mentally as well as physically from the deformity. Tapret was the first to suggest the use of a cooper's turrel for raising these depressions. Later, Boni, Boissards, and many others, began to advocate an intracranial method by placing some flat, bent instrument between the brain of the infant and the depressed bone. Still later Nicoll, Broca, and others, suggested boring the skull. In 1902, Vicarelli introduced his extracranial method, which, with a few variations, Soli considers far preferable to any other. He has the hair shaved from the depressed region, and through a small incision in the scalp and periosteum, he introduces Heine's screw, and with two or three turns, the bone is readily raised with a quick pull, and the skull resumes its normal contour. Vicarelli has designed an instrument of his own with a special mechanism to prevent its penetrating the bone too deeply and injuring the diploic vessels. There is a very sharp point on the end for making the initial incision, and a cap to protect the latter when not in use. Hauch, of Copenhagen, has had a very successful case in which he merely used a corkscrew without any preparation of the scalp. Soli has collected 20 cases which have

¹ Deutsch. Zeitschr. f. Chir., 1912, cxvii, 3-4.

been operated upon by this extracranial method, with 3 deaths. Three cases which he has operated upon himself since these statistics were collected, recovered.

THE THORAX

The Heart. WOUNDS OF THE HEART. The writers on this subject have usually assumed an optimistic attitude toward the operative treatment of wounds of the heart because of the apparently large percentage of recoveries. Most of the contributions are prompted by the desire to report one successful case in the experience of the author, but no doubt there must be many unsuccessful cases to which publicity has not been given. The value of a large series from a single clinic, in estimating the relative risk of operative procedures is well recognized, and we welcome the publication of Hesse¹ with his series of 21 cases from a single clinic. In this series, the mortality was 71 per cent., and if we compare this with the mortality (51 per cent.) in 158 cases, which I included in last year's report, we find the former is very much higher. In all of Hesse's cases there was an associated wound of the pleura; in 2, a pneumothorax; in 4, a hemothorax; and in 4, both a hemothorax and pneumothorax. The character of the injury was diagnosticated in 11 cases, regarded as probable in 4, and was not recognized in 6. The survivors have all been able to carry on their usual occupations without any evidence of cardiac embarrassment. The advantage of immediate closure of both the pleura and pericardium is borne out by the following:

	Number of cases.	Healed.	Percentage cured.
Pericardium and pleura closed	30	21	70
Pericardium and pleura drained	43	25	58
Pericardium closed and pleura drained	25	10	40

The symptoms of heart tamponade were present in only 6 of Hesse's 21 cases, and many of the other symptoms were so inconstant that he is disposed to believe there is no absolutely typical picture. The history of the case, together with the physical findings, usually suffices to make a tentative diagnosis, but, even in doubtful cases, Hesse advocates immediate exploration.

In studying the results of wounds, Simon² found that wounds of the left ventricle bleed less freely than those of the right ventricle, and those inflicted during systole enlarge during the diastolic stage of the heart's action. Non-operative measures result in recovery in only 10.15 per cent. of all cases; therefore, one is not justified in employing expectant treatment, because we know that the symptoms do not

¹ Bruns' Beitrage, 1911, lxxv, 475.

² Deut. Zeit. Chir., 1912, cxv, 254.

always indicate the severity of the wound sustained. But 10 per cent. recover in gunshot injuries treated expectantly, and even in the recovered cases sudden death, weeks or months after, is common from rupture of the cicatrix or of the secondary aneurysms. Eliminating infection, which has been controlled to some extent by the abandonment of drainage, the prognosis of gunshot wounds depends upon the amount of blood lost, the size and situation of the injury, and the injuries to other organs. As we have already pointed out on previous occasions, the prognosis is better in injuries of the left than in those of the right ventricle, and in the right rather than the left auricle. The most unfavorable cases are those with perforating wounds of both walls, and injury to the coronary vessels. Naturally, the earlier the operation is done the better: Of 23 cases operated upon within the first four hours, only 12 died, but, from this time on, the chances of recovery rapidly diminish.

In discussing the advisability of radical or conservative measures in the treatment of heart injuries, Bircher¹ refers to a gunshot wound of the right ventricle which recovered without operation. Although the bullet perforated the heart muscle, as shown by x-ray studies, and the pericardial sac contained blood, there was not enough to cause a "heart tamponade." Bircher believes, as a general rule, that better results will be observed in gunshot wounds by non-operative measures, since the wounds of the modern caliber bullet is so small that it is rapidly closed by muscular contractions. When, however, a wound is inflicted by a knife or a large caliber bullet, he admits that operation offers the best chance of recovery, and recommends the use of positive pressure. This he employed in a stab wound of the heart, and found that, when the pressure was raised, the heart was driven forward, making the introduction of the sutures easier, and at the same time lessening the hemorrhage.

The number of operations performed for injuries of the heart is increasing so rapidly that it is impossible to cite all the cases as I have done hitherto. Included in the cases reported during the past year, the number of operations for heart wounds, which we have been able to collect, is 218. Of these, 121 died, a mortality of 55.5 per cent.

CARDIAC MASSAGE. Although there have been many successful cases of resuscitation by massage of the heart, the large number of failures in cases apparently quite as favorable as those which were revived, led Erlanger² to carry out a series of investigations. Among other things, he found that tetanic stimulation of the sinus region of the auricles was a very valuable adjuvant to massage, in that it caused the auricles to generate impulses, to which the ventricles, when susceptible, would respond. When massage, administered for brief

¹ Arch. klin. Chir., 1912, xcvii, 1043.

² Journal of Experimental Medicine, 1912, xvi, 452.

periods, had failed, resuscitation was effective if combined with tetanic stimulation of the sinus. Similar experiences were observed when massage was practised for longer periods. Whether the stimulation causes the auricles to beat normally or to fibrillate seems to make no essential difference in the end-result. Not infrequently conductivity and irritability are lowered to such an extent by the cessation of the circulation, that impulses generated in an auricle, started by stimulation, at first have no effect upon the ventricles. Under such circumstances, massage alone, or, more frequently, massage plus stimulation would cause the ventricles to beat. The ventricular contraction may at first be insufficient for the maintenance of the circulation, but soon the auricular impulses begin to reach the ventricles and ventricular contractions become more rapid and effective. Even after resuscitation, the blood pressure may fail to rise above a low and insufficient level until tetanic stimulation has been resorted to.

AORTIC TRANSPLANTATIONS. Apart from the observations of Halstead and Matas on the effects of gradual closure of the aorta, there have been no attempts to influence the circulation of the aorta in the human being, or to deal with pathological lesions. As his work in arterial suture made it possible to practise anastomosis of the vessels for one reason or another, so the work which Carrel has recently done in transplanting segments of the thoracic and abdominal aortas may pave the way to dealing effectively with some of the problems that hitherto seemed humanly impossible. Carrel¹ has shown that a severed artery can be efficiently repaired by autogenic, homogenic, or heterogenic vessels in a condition of active or latent life, by devitalized arteries, by pieces of peritoneum, and even by pieces of rubber. For example, a segment of popliteal artery, extirpated from the leg of a young man and preserved for twenty-four days in cold storage, was transplanted upon the abdominal aorta of a dog, who lived in excellent health for four years. After death, the aorta was normal, but the transplanted segment was slightly dilated, and its wall was composed of connective tissue only. In another instance, a segment of dog's jugular vein, preserved for twenty-four hours in cold storage, was transplanted upon the thoracic aorta. In spite of slight lesions of the cord due to interruption of the aortic circulation during the operation, the animal remained in excellent health. After two years and two months, the dog died of an epidemic disease. The descending aorta was normal. The transplanted segment had about the same caliber as that of the aorta, but its walls were composed of connective tissue, with no evidence of muscular or elastic tissues. In both these cases, while the walls of the transplanted segments contained neither muscle nor elastic-tissue fibers, and were not thicker than those of the artery, they were able, nevertheless, to withstand the arterial pressure

¹ Journal of Experimentel Medicine, 1912, xv, 389.

of the blood without undergoing any marked dilatation. As a further illustration of the tolerance of the aorta to surgical interference, I should like to mention Boothby's¹ experiments, in which he divided the descending thoracic aorta and reunited it with a circular suture. Of six attempts, he was successful in four; two fatalities were due to thrombosis following unsuccessful attempts to close extensive tears which had been made by stay sutures.

AORTIC ANEURYSMS. While I should hesitate to criticise a method or practice with which I had had no experience, I can at least say that the method which Macewen proposes for the treatment of aneurysm appears to be founded largely on hypothetical grounds, and not to be substantiated by any very definite or conclusive facts. Macewen² introduces a fine steel needle into the interior of the aneurysmal sac or dilatation, and scratches the inner surface very lightly, not with the idea of producing a thrombus, but, rather, by wounding the sac wall, of setting up a reactionary process which ultimately will lead to thickening and strengthening of the wall, if not to complete obliteration of the sac. The advantages of this process, he claims, are obvious. There is no sudden blockage of the vessel; the process is a very gradual one, and thus affords time for the development of the anastomoses in those cases in which complete obliteration is going to take place. The thrombus is small, and so adherent to the vessel wall that detachment is practically impossible; and, as it later becomes converted into granulation tissue, emboli cannot be dislodged and enter the circulation. Clinically, the process is easy of application, in most cases no incision is required, and hence an anesthetic is unnecessary. The patient suffers but little discomfort either from the introduction of the needle or from its presence, even when it is retained for several hours.

EXPERIMENTAL PERICARDIECTOMY. In 1910, I reviewed a series of experiments by Parlavecchio which were planned to demonstrate the feasibility of removing portions of pericardium, the seat of either inflammation or neoplasm; the following year I referred to cases in which such measures had been carried out with some degree of success. During the past year, I have not run across any further clinical reports, but D'Agata³ has contributed an article on the "Physiopathology of the Pericardium," in which he endeavored to determine, (1) whether the heart can maintain its anatomical and functional integrity when a part or the whole of the pericardium is removed; (2) whether we are justified in carrying out such a procedure. In his experimental work, there was evidence of functional and anatomical changes in the heart after pericardiectomy. When the pericardium was seized or incised, the arterial pressure showed a decided tendency to fall, but, when the parietal pericardium was cocaineized, this phe-

¹ *Annals of Surgery*, 1912, lvi, 402.

² *Ibid.*, lxi, 625.

³ *Arch. f. klin. Chir.*, 1912, xeviii, 460.

nomenon was not observed. This effect of cocaine block should be borne in mind in all operations in which the pericardium must be manipulated.

TRAUMATIC HEMOPERICARDIUM. As an instance of this rather unusual condition, I think there are only 3 cases on record in English literature, the case of Gunson's¹ is cited. His patient, aged two years and seven months, had complained of pain in the chest after a fall, and two days later collapsed. It was thought at first to be a case of pericarditis with effusion. After paracentesis, by which 20 c.c. of thick blood-stained fluid was withdrawn, consciousness at once returned, and the patient's general condition was at first greatly improved, but seven hours later the child collapsed again. As a portion of broken needle was found in the child's clothing, a radiograph was taken and a fragment of needle was found embedded in the chest wall. An exploratory operation, under intravenous ether anesthesia, found the needle in the pericardium embedded in a mass of inflammatory tissue. The pericardial sac was opened and found to contain 300 c.c. of bloody fluid. Unfortunately, the sac was drained, the wound became infected, and the patient died on the fourteenth day of bronchopneumonia.

PERICARDITIS. Surgery of the pericardium has been restricted chiefly to the drainage of parietal effusions, and for the relief of secondary adhesions. Boxwell² advocates operation when the effusion, whether serous or purulent, causes orthopnea, lividity, and venous engorgement. He believes it is the only safe and satisfactory method, and the very presence of a large effusion makes the operation easier.

Von Walzel³ recommends pericardiotomy when the dangerous symptoms of heart and lung compression develop, and when there is no tendency for the exudate to be absorbed. The dangers of puncture are emphasized, particularly that of injury to the heart, which, in exudative pericarditis, almost without exception, lies near the anterior chest wall. The coronary veins, which are often greatly swollen in pericarditis, are liable to injury when a trocar is inserted, and the pleura is almost certain to be punctured.

Boxwell, too, has found paracentesis unsatisfactory; either the point of the needle is buried in the heart wall, or the eye is immediately blocked by fibrin, hence a "dry tap" results. The limited space through which a needle can reach that part of the pericardial sac where the fluid lodges, without transversing the lung, make the operation a far more difficult one than the analogous process of tapping the pleura or peritoneum. In any case, no one would think of looking for fluid, in the case of the pleura, at the point where the friction sound is loudest, and as this point, in the case of the heart, usually corresponds to the

¹ Lancet, June 8, 1912, p. 1533.

² Dublin Journal of the Medical Sciences, 1912, No. 48, p. 86.

³ Mitt. a. d. Grenzgeb. d. Med. u. Chir., 1912, xxv, 264.

only part where the pericardium is accessible, it is not to be wondered at that attempts at paracentesis so often fail.

Curschmann¹ has been able to reach the pericardium through the posterior chest wall, the trocar being introduced in the eighth interspace.

Diaphragmatic Hernia. A history of severe trauma, followed by pain in the upper abdomen and the base of the left thorax, dyspnea, and vomiting, together with physical signs pointing to displacement of the stomach or intestine into the lower left chest, and of the heart to the right, will ordinarily be sufficient to make a diagnosis of diaphragmatic hernia. When the injury has been less severe, and the symptoms and signs less definite, and in most cases of congenital diaphragmatic hernia, Griffin² emphasizes the value of radiographic and fluoroscopic examinations in making a differential diagnosis. In interpreting the plates, the most important evidence in favor of hernia of the diaphragm are: (1) Destruction of the dome shape, characteristic of the normal diaphragm line; (2) the appearance of lung tissue through the gas bubble in the left chest; and (3) the demonstration of bismuth in the colon above the level of the bow line of the chest. By fluoroscopic examination, the "paradoxical respiratory phenomenon" may be demonstrated.

Diaphragmatic hernia is not common, and the majority of cases are congenital, but most of these have been found in stillborn babes or in infants. Right-sided hernias have, as a rule, been small, and have contained a small knob of liver. The stomach has been found in the right side of the chest in one instance. Nearly all diaphragmatic hernias, however, are left-sided.

In Scudder's³ case, the omentum, transverse colon, and stomach had entered the thorax through an opening which was regarded as congenital, and which underwent gradual stretching. Positive pressure was used, and the diaphragm exposed by an incision extending along the left costal margin to the loin. By displacing this upward, together with the costal border, an admirable view of the under surface of the diaphragm, together with the hernial orifice, was obtained. The stomach was removed from the chest with some difficulty, as adhesions were present. By slightly increasing the intratracheal pressure, the lung was distended enough to almost fill the chest. The relaxation of the diaphragm accompanying the intratracheal anesthesia facilitated the introduction of the sutures in closing the hernial orifice.

Stab Wounds of the Thorax. It has been the opinion of the majority of writers that suspected injuries to the lung furnish the principal indications for operation in perforating wounds of the thorax. That this point of view is incorrect, as Lawrow⁴ endeavors to show from the

¹ The Monatshefte, 1912, xxvi, 331.

² Annals of Surgery, 1912, lv, 388.

³ Surgery, Gynecology, and Obstetrics, 1912, xv, 261.

⁴ Bruns' Beiträge, 1911, lxxvi, 545.

records of the St. Petersburg Hospital, where 257 cases were observed in a period of five years. In the majority of cases, the structures involved were not the lungs, but the diaphragm, the abdominal organs, heart, pericardium, and the vessels of the thoracic wall. Of 155 cases of perforating wound of the chest treated by operation, 78 per cent. were complicated by injuries of other organs; the diaphragm being affected in 34.4 per cent. (55 cases), the heart and pericardium in 9 per cent. (14 cases), the lungs in 27.7 per cent. (43 cases), and the bloodvessels of the chest wall in 6.4 per cent. (10 cases), and there were lesions of the mediastinum and isolated injuries of the pleura in 22 per cent. (36 cases). As a matter of fact, it is extremely difficult, if not impossible, to judge beforehand which organs are involved, and, for this reason, Lawrow maintains that an exploratory operation should be performed in every case seen within twelve hours, except where the wounds are obviously not penetrating, or are situated in the region of the scapula and interscapular space. But even here operation may be indicated when there are signs of severe hemorrhage, of pneumothorax, or of peritoneal invasion.

The operative mortality was 36.7 per cent.; excluding the injuries of the abdomen and diaphragm, 32 per cent.; and 27 per cent. when the cases complicated by heart injury are excluded. The non-operative cases, 122 in number, gave a mortality of 14.7 per cent. Comparison between these results is not justifiable, because the non-operative cases comprise a series in which the symptoms indicated injuries of mild degree, whereas the majority of the cases subjected to operative measures, by reason of the severity of the injury, were in a serious state at the time of the operation.

While we may not feel justified in subscribing to so radical a formula as Lawrow prescribes, the statistics are of particular value because of the unusual opportunity to apply a plan of procedure in a single clinic to so large a number of cases. Many, perhaps the majority, of surgeons are more disposed to look with favor on more conservative measures. Felton and Staltzenberg¹ take this position, but base their conclusions largely upon the results of injury to the lung, and overlook the point emphasized by Lawrow, that the operation is particularly indicated because of the possibility of wounds of other organs.

For purposes of exploration, Schumacher² recommends a transpleural laparotomy without resection of ribs or costal cartilages, a method which Sauerbruch applied successfully in two cases, one with three wounds of the lung, a perforation of the diaphragm, and liver; the other, in addition to a wound of the lung, had a laceration of the spleen, which necessitated its removal. In such cases, he found that sufficient exposure of both the thoracic and abdominal contents could be obtained

¹ Arch. f. klin. Chir., 1912, xcvi, 355.

² Bruns' Beiträge, 1912, lxxvii, 96.

by an intercostal incision, without resection of the ribs or costal cartilages. He makes his incision in the sixth or seventh intercostal space, where the wound can be readily widened by rib-retraction.

Schumacher¹ finds the use of differential pressure of especial advantage, not only because of the avoidance of an acute pneumothorax, but because, if a pneumothorax is already present, there is a marked improvement of the patient's condition. Multiple wounds of the lungs are readily found; when small, they may be overlooked were it not that under differential pressure they are readily detected by the forcible ejection of air or blood. That hemorrhage increases by reason of the distention of the lung with differential pressure, has not been borne out by clinical experience; on the contrary, the ready access to the injured part makes it possible to secure hemostasis promptly and securely. At the end of the operation, the normal pressure conditions of the thorax are restored by the inflation of the lung and by the expulsion of any air that may remain in the thorax.

The infection of the pleural cavity which so often complicates operations through the pleural cavity, in Tiegel's² experience is due to the unavoidable trauma upon the endothelial lining by exposure, drying, contact with compresses, instruments, etc. In spite of the prevention of postoperative pneumothorax by means of differential pressure, an exudation forms in the pleural cavity which seems to predispose to subsequent infection or pneumonia. When the exudation increases in amount sufficient to cause pressure-symptoms, it should be aspirated, and, when it becomes infected, a thoracotomy is indicated. To guard against such a contingency, primary tamponade or primary open drainage have been tried, but have proved either inadequate or too dangerous. Tiegel used, with satisfaction, a system of valvular drainage commonly employed in empyema; this system prevents a post-operative pneumothorax, provides adequate drainage, and reduces the danger of infection and pneumonia.

The Physiology of Thoracic Surgery. In this developmental stage of the surgery of the thorax there are many problems which can alone be determined with any degree of scientific accuracy by experimental work. Chief among these is the effect upon the medullary centres of the various manipulations that may be necessary in the exposure of the structures contained in the thorax. Flint's experiments³ have been conducted along these lines, and the following is a resumé of his results:

His observations, made with a closed thorax and a subsequent reduction of pressure, show that the blood pressure and heart rate are scarcely affected, the influence of the changing pressures manifesting itself chiefly in a slowing of the respiration. With a closed thorax and

¹ Deutsch. med. Woch., 1912, xxxviii, 261.

² Arch. klin. Chir., 1912, xeviii, 1022.

³ Journal of the American Medical Association, 1912, lix, 760.

ether anesthesia, an increase in pressure results in a slight slowing of the rate, due to a prolongation of the expiratory phase. When the pressure is raised to a degree sufficient to prevent lung collapse, just before the incision of the pleura, an open pneumothorax is without effect on the heart rate, blood pressure, or respiration.

In intratracheal insufflation with a perfectly adjusted catheter, there is little or no change in the blood-pressure curve. The heart rate remains unaffected, and only transitory changes are observed in the pressure. The effect on the respiratory curve depends on the volume of air delivered through the tube. When the air current has been increased to a degree sufficient to produce pressure apnea, there is a fall in blood pressure. The pressure soon rises, however. Likewise, a subsequent reduction of the air current, reinducing respiratory movements, results in a transitory rise in pressure followed by a fall to normal. These phenomena result from the inflation and deflation of the lungs, and their effect on the pulmonary circulation under the changing pressure within the tracheal catheter. With the insufflation method, the opening of the pleura exerts no influence on the blood pressure, nor is there any change in the character of the pulse curve. The respiratory curve may be altered somewhat by the partial collapse of the lungs.

Careful application of the rib-spreader, in both methods of anesthesia, yields similar results, which consist ordinarily in a transitory change in the character of the respiration, probably due to the readjustment of the respiratory musculature or to a change in the pressure on the recording tambour. The heart rate and blood pressure remain unaffected. In certain experiments, the adjustment of the spreader is followed by a marked increase in the respiratory rate and accompanied by a fall in blood pressure. This is possibly due to the tearing of the parietal pleura at the angles of the wound.

Manipulation of, or traction on, the lungs is followed by a fall in blood pressure and slowing of the pulse and respiration, the extent of which varies with the degree of traction and manipulation. An analysis of the causes of this depressor reaction seems to show that it is due to tension transmitted through the bronchi or great vessels directly to the heart. The effect of passing the ligatures around the root of the lobes, with the subsequent ligation, varies in several experiments from a fall of blood pressure and slowing of the heart rate to instances where no effect is observed at all. The effect of the removal of the lobe is the same as that elicited by traction on the stumps, and the reaction is due to the same cause. When the excision can be accomplished without pulling on the lung, no effect whatever is observed on the tracings.

Whenever traction is exerted on the ligatures attached to the lobe stumps, there is a fall in the blood pressure, accompanied by a tem-

porary inhibition of the respiration and a slight slowing of the heart rate. On the release of tension, the recovery of the blood pressure is prompt and characteristic. The manipulation necessary for the incision of the pericardium manifests itself with typical cardiac inhibition which lasts as long as the irritation of the pericardium continues. In all probability, this effect is due to direct mechanical cardiac stimulation through the pericardium, inasmuch as it differs in no way from the effect produced by touching or manipulating the heart itself.

Sauerbruch has recommended compression of the great vessels of the root of the heart between the fingers as a means of temporary hemostasis during heart suture. The physiological effects of this procedure is shown by a sharp fall in the blood pressure from 90 to 12 mm., from which there is a prompt recovery on release of the constriction, but the experiment is followed for a short time by a vagus type of pulse.

In order to secure a good exposure of the heart and esophagus, it is often necessary to pack off the lungs with gauze. This procedure is followed by a temporary drop in the blood pressure from which there is usually prompt recovery. During this period, there is also a slowing of the respiration, but the rate returns to normal with the restoration of the pressure.

In one experiment both vagi were dissected from the esophagus, preliminary to partial esophagectomy. In this instance, no effect was observed on the blood pressure, heart rate, or respiration. Similarly, separation of the diaphragm from the stomach and esophagus, when carefully carried out, is without effect on respiration, heart rate, or blood pressure.

Pharyngeal Insufflation in Artificial Respiration. The need of a single but efficient method of artificial respiration, for use in the practice of surgery and internal medicine, as well as in the accidents and intoxications in industrial life, led Meltzer¹ to devise such an apparatus which, in its simplest form, consists in (1) the introduction of a catheter into the pharynx; (2) pulling out of the tongue; (3) pressing the suprahyoid region against the roof of the mouth; (4) putting the abdomen under constant pressure, and (5) connecting the catheter with bellows.

When, during compression of the bellows, air is driven into the pharynx, it can escape through the mouth, the nose, into the stomach, and into the lungs. The ready return of the insufflated air through the mouth is restricted in this method by pressing the fleshy part of the tongue against the roof of the mouth. The escape through the nose is somewhat restricted, partly by the pressure against the roof of the mouth, which also raises the soft palate, and partly by the presence of the catheter in the pharynx which also assists in raising the soft palate as well as the uvula. The escape into the stomach may

¹ Journal of the American Medical Association, 1912, lviii, 1413.

occur readily, if the air pressure within the pharynx caused by the insufflation is considerable and the pressure exerted on the suprahyoid region is so strong as to prevent completely, or restrict excessively, the escape of the surplus air through the mouth. But this escape into the stomach can be entirely prevented, or restricted to a harmless minimum, by putting the abdomen under sufficient external pressure. Under these circumstances, the surplus air in the pharynx during each insufflation readily enters into the lungs in a quantity and with a force sufficient to perform an efficient inspiration which, on account of the pressure on the abdomen, consists, in this case, chiefly in distention of the thorax with but little descent of the diaphragm.

In another series of experiments, Meltzer studied the efficiency of this method, with the addition of a tube introduced into the stomach. Under these conditions, no pressure on the abdomen is necessary, because all surplus air which may enter during insufflation through the esophagus alongside the tube into the stomach, escapes readily outside through the stomach-tube.

Meltzer's experimental studies convinced him that, by means of these methods of pharyngeal insufflation, artificial respiration can be kept up efficiently, and animals will be surely resuscitated from a purely respiratory death. He recommends the method on human beings wherever there is any need of artificial respiration. There are cases in surgery on the brain, the thorax, or on other parts of the body, in which the respiration ceases while the heart is still beating. There are cases of respiratory insufficiency also in internal medicine, for instance, in postdiphtheritic paralysis, in poliomyelitis, or in some cases of eclampsia or coma. And there are the poisonings by morphine, illuminating gas, etc., or the shocks in accidents. The pharyngeal insufflation, when carried out with care, can certainly do no harm; its execution is very simple, and it ought to be tested in any of these cases.

To facilitate the application of the method, Meltzer describes concisely the manner of its application as he believes it ought to be used in human beings. The tube to be inserted into the pharynx should be a No. 15 American (or No. 22 French) catheter. If there is no catheter at hand, any tube of a similar diameter will serve the purpose, but it ought to possess sufficient resistance and should have at least one fair-sized lateral opening near its end. The catheter should be introduced into the pharynx about five and one-half inches from the teeth. The tongue should be pulled out and held by a tongue-forceps, the continuation of which is, however, not indispensable, since the bandage will later keep the tongue in proper position. Then a pad, about one inch long and one inch thick, made of gauze, cotton, or any other material, should be placed under the chin on the suprahyoid region, and pressed upward by means of a bandage or a folded handkerchief

tied at first only moderately firmly over the head. By the suprahyoid region is meant the part of the submental region which is nearest to the hyoid region; pressure on this part presses the middle part of the tongue against the posterior part of the hard palate. The bandage over the head should be tied over the posterior part of the parietal bones.

Now some weight should be placed on the abdomen. In unconscious individuals, the abdominal wall offers no resistance, and a load of from twelve to thirteen pounds will be sufficient to exert the necessary pressure.

The bellows, which need not be of very large size, are now connected with the catheter, and the manipulation may begin. Care should be taken that at the beginning the compression should not be made too forcibly and rapidly, and not oftener than ten or twelve times per minute. If each compression causes only a slight heaving of the chest, the bandage over the head should be tightened, and, if the heaving appears to be too strong, the bandage should be loosened correspondingly. Here, as in the method of intratracheal insufflation, too much pressure and careless handling may do harm. The compression should never be made so tight as to make the escape of air through the mouth impossible or very difficult.

The handling of the bellows is often fatiguing; but the effort can be greatly reduced by fastening one handle by means of a screw-clamp to a table and making the other handle several feet long; the working of the bellows is then very easy.

The introduction of a tube into the stomach permits the handling of the insufflation with greater force, more efficiency, and even greater safety. In some cases the use of the stomach-tube might be even indispensable, when, for one reason or another, no weight can be placed on the abdomen. The stomach-tube should not be too small in diameter, should have two lateral openings near its end, and should be introduced at least sixteen inches from the teeth. It should be introduced before the pharyngeal tube. There is no objection to having both devices together—the stomach-tube and the weight on the stomach.

Finally, it is evident that the pharyngeal insufflation ought to be capable of rendering good service in the asphyxia of the newborn. After introducing proper-sized catheters into the stomach and the pharynx, and after applying properly a bandage around the chin and head, the pharyngeal catheter should be connected simply with a rubber bulb of an atomizer and the artificial respiration can be started. This simple arrangement will probably be sufficient also for the resuscitation of babies one or two years old.

Elsberg¹ also calls attention to the value of insufflation of pure air,

¹ New York State Journal of Medicine, 1912, xii, 524.

or of air and oxygen, as a method of artificial respiration. This is a feature upon which too little stress has thus far been laid. Whenever there is need for prolonged artificial respiration, such as in opium poisoning, drowning, etc., the method will surely be very useful. In several instances patients have been kept alive and in good condition from three to seven hours, although during that time they never made a single respiratory movement. The color of the patients remained pink, and their blood was well aerated. It is a valuable characteristic of insufflation anesthesia that the patients need not breathe in order to have oxygenation of their blood occur; the apparatus does the breathing for them. In this respect, the method differs from all other apparatus for the purpose, and it has this advantage over both the positive and negative pressure methods for thoracic surgery, in the latter the respiratory movements of the patients are absolutely necessary, without them aëration of the blood cannot occur, but oxygenation of the blood will occur just as well whether the patient makes respiratory movements or not with intratracheal insufflation.

Kerr¹ reports a case in which insufflation was used to resuscitate a case of edema of the glottis following thyroidectomy, and the patient's life was undoubtedly saved by this means.

Plauchu² has employed insufflation in his obstetrical practice with promising and highly interesting results. In the resuscitation of asphyxiated infants, the method must be applied under well-defined conditions. If it is used in mild cases of asphyxiation, it is certain that it will give constant positive results as do all the other methods. If it is used in the cases in which apparent death is not due to asphyxiation, but to traumatism of the brain or of the medulla oblongata, it will yield negative results. Therefore, the method is of value only in those cases of deep asphyxia of the newborn, caused by long intrauterine compression or by interference with the fetal-maternal circulation, as, for instance, from compression of the umbilical cord.

Intratracheal Insufflation. Robinson,³ in discussing the choice of differential pressure methods and intratracheal insufflation, states that a preference would be difficult as regards their adequacy to maintain life. The test of the comparison rests in the application of the methods to the more serious thoracic cases. Many chest operations have been performed by all methods. A surprisingly large proportion of these have been in cases where the apparatus has been used more as a consolation or experiment than a necessity—in other words, cases in which the result and even the progress during operation might have been equally good without the apparatus. It is Robinson's opinion that experience with intratracheal insufflation in such cases may

¹ Virginia Medical Semi-Monthly, 1912, xvii, 157.

² American Journal Diseases of Children, 1912, iii, 50.

³ Surgery, Gynecology, and Obstetrics, 1912, xiv, 462.

demonstrate that the patient can be kept in a better condition during operation than when positive pressure is employed. While positive pressure has maintained a sufficient oxygenation to preserve life, and the subjective respiratory movements have been apparently sufficient to prevent complete stasis of gases, the question may be one of degree. The confusion of symptoms attributable to certain steps of the operation, or to certain preëxisting pathological conditions, form a complex picture which makes it difficult to determine how well the differential pressure is performing its function. Time alone will prove whether the benefits of differential pressures are limited, and whether intratracheal insufflation in similar cases will, by maintaining an even oxygenation regardless of the respiratory excursions, increase the resistance of the patient both during and subsequent to the operation.

The application of positive pressure through a face mask to the nose and mouth has, in a sufficient number of thoracic operations, adequately fulfilled the requirements. Its temporary removal in case of such unusual emergencies as vomiting and instrumentation has not been found to interfere with its successful employment. Having then the simpler and equally satisfactory mask method of positive pressure at our disposal, it is improbable that the overpressure cabinets and head-chambers will continue to be constructed.

Robinson describes in detail the apparatus which he designed for use in thoracic surgery under intratracheal insufflation or positive pressure; for ether anesthesia by mask, intrapharyngeal, intratracheal, and intrabuccal methods. Pharyngeal anesthesia is also far superior to the usual cone or drop method, not only for reasons of convenience to the operator, but also because here, again, the constant mechanical factors maintain a steady anesthesia. In Robinson's experience, the pharyngeal method does not effect as ideal an anesthesia as the intratracheal method, although it is simpler of application, and, it may be argued, that where intratracheal ether is contraindicated, all its purposes may be accomplished by pharyngeal anesthesia. On the contrary, the results of intratracheal cases have shown so conclusively that postoperative complications do not occur, it may be said that it is rarely contraindicated, and the pharyngeal ether should be substituted only because less delay results, and also because little training is necessary for its application, while the introduction of a tracheal tube requires some paraphernalia and some experience. If further experience demonstrates that intratracheal ether should not be administered, the pharyngeal method immediately will become the one of choice.

The greatest difficulties in the administration of an anesthetic by the ordinary method, in Woolsey's¹ experience, are to be found in conditions of the air passages between the teeth and the trachea; anything which interferes with the proper respiratory exchange, and

¹ New York State Journal of Medicine, 1912, xii, 167.

therefore with proper dosage of the anesthetic, such as collapsed, thin ala nasi, valve-like lips, recedent tongue and jaw, paralyzed soft palate and glottis, with or without a hypersecretion of mucus. Alternating toxic dosage of the anesthetic and too superficial narcosis, with muscular rigidity and labored breathing will further aggravate the situation. The tracheal exhibition of anesthetic vapors, as instituted in insufflation narcosis, carries the anesthetic well past these obstructive possibilities of the external respiratory apparatus. Even with the most unfavorable subject for anesthetization, after the introduction of the tracheal tube, and insufflation of pure oxygen, one sees the deadly cyanosis disappear, the labored breathing becomes quiet, and the intermittent pulse becomes regular. The anoxemia has been eliminated, the external respiratory obstruction done away with, the ether cut to one-quarter its previous dosage and administered in continuous minimum quantity.

In almost five hundred operations under insufflation anesthesia, Elsberg¹ has never seen any bad after-effects. The tube is well tolerated by the larynx and trachea. The patients do not complain of laryngeal discomfort of any kind after the operation. In not a single instance has he observed any pulmonary signs after the anesthesia. Vomiting is very unusual after insufflation anesthesia, and, even after operations lasting several hours, the patients are free from nausea and vomiting. This method of anesthesia is of great value in cases of intestinal obstruction, for it entirely does away with the danger of aspiration of vomited matter, and prevents bronchopneumonia. The anesthesia seems to be especially well borne by weak and cachectic patients, as they seem to be far less apt to present symptoms of shock after an operation done with this method of anesthesia. The anesthesia seems to be very valuable for those patients who have a chronic bronchitis or some pulmonary affection, as the danger from pneumonia seems to be avoided entirely.

Bronchoscopy. Stenosis of the bronchi may follow traumatism or any chronic inflammatory process, such as tuberculosis or syphilis. These strictures sometimes require dilatation in order to secure proper drainage of the bronchiectatic cavity below the point of obstruction. For syphilitic stricture, Jackson² recommends, in some cases, prolonged intubation with bronchial intubation tubes, introduced with the aid of the bronchoscope and left *in situ* for a period of from one to seven days.

In cases of traumatic cicatricial stenosis following the prolonged retention of a foreign body, Jackson believes that access to the body is obtained most easily by the use of divulsors. He reports 2 cases in which a foreign body was removed after being retained for seven and

¹ New York State Journal of Medicine, 1912, xii, 524.

² Journal of the American Medical Association, 1912, lix, 1123.

ten years respectively. From these observations, he concludes that very minute bodies become encysted or invade the interlobular connective tissue, as in anthracosis, but aspirated bodies of larger size apparently rarely, if ever, become encysted, although a pocket may be formed in which the body rests. The foreign body, by gravity and aspiration, reaches the smallest bronchus it can enter, and there its progress is arrested. As a result of mechanical irritation combined with infection, there results a productive inflammation, which first completely occludes the involved bronchus with swollen mucosa, and terminates the formation of an abscess of the lung below the foreign body. Later, sloughing or ulceration follows in the tissues surrounding the foreign body, permitting the slow escape of discharges, which, as they accumulate, lead to a bronchiectasis above the obstruction. Finally, a cicatricial stricture may develop at the site of the obstruction.

While it is not known how frequently foreign bodies may be the cause of bronchiectasis, the similarity of the symptoms of bronchiectasis to those of foreign bodies in the bronchi, would, in Jackson's opinion, render exploratory bronchoscopy advisable even in a case with a negative radiograph. The presence of a foreign body should be suspected in every case of seeming tuberculosis, in which no bacilli are found in a purulent sputum, and especially if the symptoms are confined to the lower lobe, particularly on the right side.

The advantages of bronchoscopy in other affections of the bronchial system is noted by Freudenthal,¹ whose views are summarized as follows: Bronchial asthma may be produced reflexly by disease in different parts of the body. Therefore, every asthmatic should be examined thoroughly, and if gross lesions are found in the nose and throat, in the uterus or digestive tract, etc., they should be treated carefully, after which the asthma frequently disappears. In many instances this is insufficient, and in such instances the asthmogenous points in certain parts of the bronchial ramification need special treatment, and this is accomplished by local applications. While this, in many instances, is a difficult task, most gratifying and satisfactory results are often obtained.

In the diagnosis of foreign bodies in the air passages, Renking² states that too much value is placed upon the usual methods of examination, while important information to be ascertained from the history is apt to be overlooked. He emphasizes this point by reference to certain obscure cases which he treated, in which, after careful questioning, the history of aspiration of a foreign body was obtained. In spite of the fact that percussion, auscultation, and radiography failed to locate a foreign body, bronchoscopy was performed in one case

¹ Journal of the American Medical Association, 1912, lix, 1108.

² Deutsch. med. Woch., 1912, xxxvii, 2225.

because of the history of coughing attacks following the possible aspiration of a foreign body. This revealed three splinters of bone in the bronchus of the right lower lobe of the lung, and the removal of these bodies was followed by immediate relief and ultimate cure.

Empyema. The application of negative pressure in the treatment of acute and subacute empyema, as advocated by von Eberts, was discussed in *PROGRESSIVE MEDICINE*, March, 1912. Since then, the author¹ reports several additional cases of "chronic unopened empyema" which, he believes, furnish unquestionable proof that extensive chronic empyemas, in which the cavities have not been exposed to postoperative pneumothorax and secondary infection, may be cured by this means. The most important lesson to be drawn from his clinical observations is that, in chronic unopened empyemas, thickening and fixation of the walls are not always present, and, conversely, that a greatly thickened and rigid visceral pleura, as seen in chronic empyemas which have been drained in the usual way, may be assumed, in many cases, to be the product of postoperative pneumothorax and the accompanying secondary infection. Whatever form of apparatus is employed, the one essential is the constant maintenance of a partial vacuum within the cavity. The average period of the patient's stay in the hospital is reduced by at least one-half.

Empyema in children presents certain problems apart from those met with in adults. Thus, in Zybells's² report of 22 cases, only 3 of which were over one year of age, the symptoms, while occasionally typical and not differing materially from those of the adult, were by no means constant in the majority of cases. Exploratory puncture constitutes the most important and often the only reliable means of diagnosis; even in very young children, it should be resorted to early, and repeated in doubtful cases. But the recovery of pus is not always indicative of empyema, as the pus may come from an abscess cavity in the lung, especially as pneumonic consolidations in children have a pronounced tendency to undergo suppuration, a condition noted in 7 of the 22 cases.

The disease manifests itself in the form of an acute primary infection, which pursues a rapid course, or may be secondary to other infections, and become chronic in nature, and is often overlooked for long periods of time. Not infrequently the conspicuous features are gastro-intestinal disturbances, loss of appetite, vomiting, diarrhea, loss of weight, the physical signs of empyema being not at all pronounced.

From the prognostic standpoint, the temperature curve has little or no significance, and much more depends upon individual resistance than on the type and virulency of the infection. The weight of the patient affords perhaps the most reliable means of prognosticating the

¹ *Journal of the American Medical Association*, 1912, lix, 264.

² *Monatsheft f. Kinderheilkunde*, 1912, xi, 93.

course of the affection, as it is well known that the establishment of an empyema is attended with rapid emaciation. Experience has shown beyond doubt that rib resection, while well borne by adults, is followed by an extraordinarily high mortality in children, and, after secondary resection following puncture, the results are not much better. The most encouraging results, with least danger, follow simple paracentesis repeated as often as may be indicated.

The treatment of pleurisy by means of nitrogen injections, Arnsperger¹ regards as a rational procedure, in that the inflamed pleural surfaces are separated and adhesions are prevented. The method is advocated only after the effusion has been evacuated. One hundred and fifty to 600 c.c. of nitrogen is sufficient to keep the pleural surfaces apart without compressing the lung. One, two, or more injections were required in the 7 cases reported, and the results were said to be encouraging.

The suction bell, which Krause² applied first to the extraction of brain tumors, he found useful in securing expansion of the lung after an extensive rib resection. The latter enabled him to suture the lung to the parietal pleura and, at the same time, to prevent its collapse. Such operations are, of course, best carried out by differential pressure, but, when this is impossible, suction, as above applied, furnishes an easy and safe means of preventing pulmonary collapse.

One of the unfortunate, and, I might say, almost inevitable results of disease of the costal cartilages is the formation of a fistula which persists often in spite of repeated operations. The same sequel is observed after resection of cartilage, even in clean cases. In studying the process of necrosis in aseptic cases, Exhausen³ came to the conclusion that the leukocytes and granulation tissue of the reparative process exerted a destructive or peptogenic action and alternate necrosis of the cartilage; this sequence of events takes place whenever a portion of cartilage is exposed in a granulating wound. To prevent it, the entire cartilage should be resected at the primary operation, or the end of the divided cartilage should be covered with muscle or flaps from the soft tissue. Which of these procedures can best be carried out will depend upon the character of the lesion and the type of operation.

The Surgery of Chronic Disease of the Lung. In Robinson's⁴ review of the surgical affections of the lung amenable to surgical treatment, he calls attention to the fact that operations for acute and chronic empyema, and acute postpneumonic abscess, may be performed with equally good results without the use of differential apparatus.

¹ *Ther. der Gegenwart*, 1911, lii, 481.

² *Med. Klinik*, 1912, vii, 2005.

³ *Arch. klin. Chir.*, 1912, xcix, 219.

⁴ *Journal of the American Medical Association*, 1912, lix, 169.

Any extensive thoracic operations for non-infectious lesions, in the absence of adhesions, is, by the exclusion of the dangers of wide-open pneumothorax, deprived of at least one of its former dangers. This includes exploratory operations for diagnosis, excisions of tumors, or strictures of the esophagus and cardia, tumors of the chest wall, not involving the lung, diaphragmatic hernias, traumatic heart lesions approached transpleurally, and intrathoracic lesions requiring blood-vessel suturing. To these the cautious operator may add any operation on the chest in which there is the possibility of accidental opening of a normal pleura. In these cases, apparatus is unquestionably indicated. They represent a new field in thoracic surgery, and, despite the hitherto limited successes, progress is evident.

In bronchiectasis, chronic abscess, tuberculosis, and actinomycosis, and tumors of the lung and pleura, pneumothorax is *a priori* not a great danger, because of the ever-present adhesions. It cannot be claimed that either differential pressure or intratracheal insufflation have as yet bettered the results in operations for these diseases. Intratracheal ether, however, provides the best anesthesia for this group, and, with its accompanying insufflation, supports an already limited respiratory function.

The number of invalids slowly succumbing to chronic lung infections, admittedly beyond cure by medication, is greater than is recognized. Realizing the hopelessness of medication and the inadequacy of operative treatment, practitioners rarely send such patients to hospitals, and, at the present time, they are to be found also in the institutions for chronic diseases. That these chronic infections are amenable to surgical treatment cannot be denied, despite its present doubtful status; and it may be argued that our attention should be devoted to progress along these lines, as well as to the development of the more radical procedures for non-infectious conditions.

Evidences from experimental and clinical experiences tend to show that the surgery of the future in tuberculosis, bronchiectasis, and chronic abscess of the lung will consist in conservative, rather than radical, measures. The conservatism of the past has perhaps been erroneous. It has consisted largely in the attempt to drain lung cavities resulting from any of these three diseases. The drainage of tuberculous cavities has not been attended with cure because of the diffuse nature of the disease. Even though only one cavity of inconsiderable size may exist, the tuberculous infection is invariably more extensive, and remains unrelieved. Drainage of bronchiectatic cavities has rarely been followed by cure, and seldom by improvement. Rarely does one cavity exist alone. The profuse sputum results from the confluence of the contents of many smaller cavities, even though the process be confined to one lobe of the lung. In chronic abscess of non-influenzal origin, multiple foci are frequently present, surrounded by chronic

pneumonic thickening. The rigidity of the surrounding tissues tends to prevent the healing of these drained foci, and bronchial fistulas and chronic sinuses persist, sometimes diminishing the amount of sputum but rarely curing the patient.

Lung resection is obviously the idealist's ambition in attacking bronchiectasis and chronic abscess. The successful removal of the lung lobe in selected cases would undoubtedly result in cure. The total removal of the lower lobe for lobar bronchiectasis and chronic abscess confined to the lower lobe will doubtless be the ultimate source of cure in some instances; but attempts to perform this operation in one radical procedure have thus far failed. Excision was the terminal procedure following a series of preliminary drainage operations which had resulted in a collapse of the lobe with shrinkage of the inflamed tissue, often accompanied by empyema. We should attack these cases by performing preliminary operations to produce collapse and shrinkage, thus preparing the chest wall, as well as the lung itself, for an excision operation.

The value of compression or immobilization prepares the lung lobe for subsequent excision, but is of therapeutic value in itself. The compression may be artificially produced by four methods. Nitrogen gas or fluid may be introduced between the pleural layers, causing artificial pneumo- or hydrothorax. The chest wall may be rendered collapsible by the resection of many ribs, from the first or second to the ninth, inclusive. In this operation, the pleural cavity is not opened. The pulmonary arterial supply to a lobe may be cut off. An interalveolar connective-tissue formation results, and a shrinkage of the whole lobe occurs. The fourth method is that which results from rib resection and opening of the pleural cavity, followed by pneumotomy for abscess or cavity drainage. Reasonable as this theory of compression may at first seem, the question arises as to how far practical application has determined its value. As in all surgical procedures, the success has in part at least depended on the selection of the method of compression best suited to the nature of the disease.

The best surgical treatment of pulmonary tuberculosis is lung compression produced by the injection of nitrogen gas. An extensive resection of ribs in a phthisical patient to produce compression, which may likewise be accomplished by the injection of nitrogen gas into the pleural cavity, is eminently unsound. Furthermore, it is open to question whether this pleuropneumolysis rib-resection operation of Friedrich should be performed even on patients in whom pleural adhesions are too extensive to admit an artificial pneumothorax injection.

Bronchiectasis continues to face surgical interference with stubborn resistance. There is no case of bronchiectasis on record in which a complete cure has resulted from the pleural injection of gases or fluid.

The condition has been relieved and the sputum quantity diminished, but the process does not succumb to compression therapy alone, as might be expected. Robinson believes that our one hope of attacking bronchiectasis is by a preliminary compression followed by excision. If this combined treatment is to be accomplished, what method of compression should be previously employed? That depends on the case in hand. In no case should extrapleural rib resection be used. Artificial nitrogen pneumothorax may be employed, if adhesions are not too extensive.

Another interesting method of producing lung compression has been brought to notice by the experimental investigations of Sauerbruch and Bruns, by ligating the pulmonary arterial branch of the lower lobe of one lung. Of the four forms of compression therapy mentioned, Robinson finds himself least enthusiastic regarding the extensive extrapleural rib resection in tuberculosis, bronchiectasis, or even chronic abscess.

While Sauerbruch¹ recognizes the dangers of extensive thoracic plastic operations in pulmonary tuberculosis, he still seems to advocate this formidable procedure and applies it frequently. Perhaps the most serious complication is the embarrassment of the heart, due, in large measure, to displacement of the mediastinum and its contents toward the opposite lung. Respiratory disturbances are attributed to diminished supply of air and imperfect oxygenation. Upon expiration, a portion of the air enters the collapsed lung, passing from the sound to the diseased lung. Thus dyspnea results, and is further increased by the retention of sputum in the collapsed lung, because expectoration is ineffectual when the ribs have been removed.

The majority of these operations Sauerbruch believes can be carried out under local anesthesia, and the operation must be planned and adapted to the needs of each case and the localization of the tuberculous focus. Repeated restricted resections have given more satisfactory results than the more extensive ones, and are not as dangerous. Of the 32 patients operated upon by Sauerbruch, with 1 death, 8 had bronchiectasis and 24 tuberculosis. Two of the 24 cases of tuberculosis were completely cured, 2 almost cured, 4 considerably improved, 7 moderately, 2 not at all.

Operations in the Anterior Mediastinum. The anatomical peculiarities of the anterior mediastinum make operations both dangerous and difficult, and, thus far, operative interference has been restricted to the extirpation of malignant tumors, or of an enlarged thymus gland, as undertaken by Sauerbruch² in a case of exophthalmic goitre. Through a longitudinal incision the sternum is split, and, if its edges are well retracted, a very satisfactory exposure is secured; even if the condition

¹ Cor.-Bl. f. schweiz. Aerzte, 1912, xlii, 225.

² Bruns Beitrag., 1912, lxxvii, 1.

prove to be inoperable, the operation affords considerable relief by releasing pressure on the vessels and trachea. In 3 of Sauerbruch's cases, he found an inoperable tumor; in the fourth, a case of exophthalmic goitre, the condition was improved after extirpation of a thymus gland weighing 49 grams. Medical therapy, and ligation of the superior thyroid artery, had been without effect. The blood became normal, the exophthalmos subsided, and the pulse-rate dropped from a maximum of 140 to 100.

While differential positive pressure reduces the stridor, cyanosis, and stasis of blood, not only in cases of mediastinal growths, but in a variety of instances of tracheal stenosis, as shown by Nageli,¹ I believe the use of intratracheal anesthesia in these operations would not only be equally, but more, efficacious especially in the presence of a thickened and rigid trachea, where the dyspnea would not be relieved by positive pressure.

Mediastinitis. Chronic inflammation of the mediastinum, with the formation of adhesions involving the diaphragm, pleural, and other structures, may lead to obstruction of the venous and lymphatic circulation, and provoke a group of symptoms suggestive of an abdominal lesion. In the earlier stages of these chronic affections, an acute septic pericarditis may develop, and even simulate a duodenal or gastric perforation. In this connection, I might cite a case of Cobb's² in which there was a chronic obstructive process in the mediastinum, originating in all probability in a lesion of the bronchial or mediastinal lymph nodes. The obstruction had already caused hyperemia and marked enlargement of the liver, notwithstanding which the patient had felt perfectly well until, after prolonged exposure, he was suddenly seized with dyspnea, abdominal pain, and tenderness. The latter were attributed to an acute, pericardial infection, and to the existing mediastinal obstruction. The distention of the pericardial sac aggravated the mediastinal obstruction and the congestion of the liver, while the tension of the liver capsule following the congestion increased the pain and accounted for the exquisite and widespread tenderness.

Chondrotomy: Apical Tuberculosis. Much attention has been given to Freund's theory of the relation of apical tuberculosis to certain anomalies of the upper portion of the thorax. There is, however, by no means a unanimity of opinion on this point. The abnormal shortening and ossification of the first rib, which Freund regards as a predisposing factor in the development of tuberculosis, Sumita³ looks upon as the evidence only of disturbance in growth of the cartilage, such as might be explained by altered nutrition of function, and not at all as specific changes. They are seen in other costal cartilages,

¹ Bruns' Beiträge, 1912, lxxvii, 237.

² Annals of Surgery, vol. lvi, p. 565.

³ Deutsch. Zeit. f. Chir., 1911, cxiii, 49.

but the first, for anatomical and physiological conditions is most commonly affected. The disturbance in growth of the first costal cartilage and its resulting shortening and ossification is a secondary, rather than a primary, factor in tuberculosis, and may be due to a variety of conditions which may arise in the lung, from injury from without, from local or general circulatory disturbances, from changes in the blood, or from constitutional diseases. From a careful histological study, Sumita found that the sheath-like ossification did not arise from the perichondrium, but was due to an abnormal extension of peripheral ossification and was always in continuity with the ribs or sternum. The formation of a joint in the first cartilage is an accidental occurrence of traumatic origin, and has nothing to do with the healing of an apical tuberculosis, as Freund would have us believe. The indications for Freund's operation of chondrotomy in tuberculosis are therefore limited, according to Sumita, but might be of value occasionally when used in conjunction with respiratory gymnastics. On the other hand, the operation is worthy of recommendation in emphysema, as it relieves the subjective symptoms of the patient and serves as a prophylactic measure against the venous stasis which results from the dilatation of the right ventricle.

While, from the purely theoretical side of the question, the claims of Freund may seem to be without justification, the relief and the improvement which follow, prompted Kausch¹ to resort to chondrotomy in five instances. The interval elapsing since the operation has been three or four years, and definite and permanent relief was noted in each case. So far, there have been no ill effects reported, so that the procedure may be regarded as without danger, and should be used more frequently. Braun² adds his indorsement of the operation. In one case, the operation was followed by an increase of 1200 c.c. in the vital capacity of the lung, and the stiff and immovable thorax became expansile, and the bronchitis and dyspnea entirely disappeared.

Abscess of the Lung. Solitary abscess of the lung most frequently occurs as a sequel of pneumonia, and its characteristic symptom is the expectoration of large quantities of purulent and fetid sputum containing portions of the lung which undergoes necrosis and ulceration. Not infrequently, according to von Eberts,³ an abscess in the extreme periphery of a lobe may extend in the direction of the pleura and cause a secondary thoracic empyema. In fact, it is well known that the mural forms of empyema are usually secondary to lung abscess. The x-ray has proved of considerable value in the localization of lung abscess. While the radiograph may show an extensive infiltration, there is usually a zone of maximum intensity. In deciding upon the

¹ Arch. klin. Chir., 1912, xcviii, 1093.

² Deutsch. med. Woch., 1912, xxxviii, 1489.

³ Canadian Medical Association Journal, 1911, i, 1165.

point of attack, the physical signs must be given due consideration. In chronic abscess of the lower lobe, less reliance should be placed upon the radiograph and more on the physical signs. In about 1 case out of 3, the pleuræ at the site of operation are found to be free from adhesions, so that it is advisable, when operating, to have at hand a pressure apparatus to forestall the dangers of a pneumothorax.

Intrathoracic Tumors. In reviewing the symptomatology of intrathoracic tumors, Steele¹ finds that pain is rarely absent, and often accompanied by dyspnea and insomnia. The pain is caused by pressure on the somatic nerves, as is apt to occur in aneurysm of the descending aorta or in tumor involving the spine. In aneurysm the pain is more definite and persistent, while in intrathoracic tumor it is more indefinite and may be often a sense of distress.

Dyspnea is a very suggestive symptom, and may be due to the pressure of a tumor, or to a pleural effusion. Dropsy of the lower extremities and trunk is frequently observed as a terminal symptom when the tumor does not interfere directly with the inferior vena cava. Prolonged repeated slight hemoptysis has long been recognized as significant of intrathoracic growth involving the lung. While it may be a late symptom in aneurysm, in neoplasm one sees it early and often constantly. One should not be misled by this one symptom to suspect tuberculosis. In addition to the physical signs of neoplasm, there may be associated symptoms from pressure on the brachial plexus, the esophagus, and the cervical sympathetic system. The lymphatics of the lung and pleura are independent, so that a primary carcinoma of the lung does not involve the pleura except by contiguity. In rare instances, a primary carcinoma of the bronchus may remain a local affection, and not invade the surrounding lung beyond the lobe affected. A case of this type was observed by M'Intyre,² and is worthy of note because the cancer was associated with chronic tuberculosis with cavity formation. The patient's illness, until the time of death, covered a period of four and one-half months. Shortness of breath, and cough, with expectoration, small in amount and occasionally streaked with blood, were the first symptoms. The shortness of breath gradually became worse, and toward the termination of his illness breathing was continuously labored, and the expectoration purulent and fetid. there were no symptoms indicative of intrathoracic pressure, the signs pointed rather to some obstruction of the bronchus of the upper lobe of the left lung.

Edlavitch³ epitomizes the important facts in regard to cancer of the lung, as follows: There is abundant evidence of the occurrence of primary carcinoma of the lung as a definite pathological entity. This

¹ Lancet, 1911, clxxx, 1605.

² Glasgow Medical Journal, 1912, lxxviii, 95.

³ Journal of the American Medical Association, 1912, lix, 181.

tumor originates mostly in the epithelium of the bronchi, not infrequently in the alveolar epithelium, and sometimes in the epithelium of the bronchial mucous glands. It is about three times more common in men than in women. The right side is affected about twice as often as the left side. It may involve part, or all, of a lobe or an entire lung; it is usually unilateral, and often fairly well circumscribed. The bronchial lymph nodes are practically always involved, but other parts, principally the brain, which seem to be especially susceptible, may become involved by secondary metastasis. Pleural effusion, mostly hemorrhagic in character, occurs quite constantly in association with this condition. In suspected cases the presence of large epithelial cells in this pleuritic fluid may be regarded as of diagnostic importance.

Postoperative Pulmonary Complications. These follow more especially abdominal operations, and many have been attributed to such factors as ether anesthesia, hypostatic congestion due to cardiac or circulatory disturbances, infections, and embolism. When we realize that, no matter what precautions are taken, a certain number of bacteria are present in many abdominal operations, and that a direct communication exists between the abdomen and thorax, we can account at least for some of the above complications. Postoperative pneumonia and gangrene are due probably to the same underlying cause, an infection from the bronchi, or from the abdominal cavity, reaching the lung through the lymph or blood circulation. The process develops as a suppurative one in some instances, or goes on to the stage of gangrene when the saprophytic microorganisms are present. Gangrene of the lung constituted an extraordinarily frequent complication in Coenen's¹ experience after resection of the duodenum, occurring 8 times in 136 stomach, and 2 duodenal, resections. I should say, from my own results and from the statistics of a number of clinics, that this must be a very unusual experience, and the explanation found in some faulty technique or careless anesthetization.

Artificial Pneumothorax in Tuberculosis. The production of an artificial pneumothorax, as a treatment of pulmonary tuberculosis, seems to be gaining in popularity in this country, though for many years the procedure had its advocates in Continental Europe. It is impossible to review the many excellent articles dealing with this subject, so I will refer only to the results obtained by Robinson and Floyd,² in a series of 28 cases treated during a period of two and one-half years, all of which with three exceptions were advanced cases and had failed to respond to other therapeutic measures. With the exception of three cases in which a pleural space could not be established, distinct relief was the immediate result in practically all cases. The tuberculous process has been

¹ *Deutsch. med. Woch.*, 1912, xxv, 1169.

² *Archives of Internal Medicine*, 1912, ix, 452.

arrested in at least six cases that have been under constant observation, and, in two instances, the process was arrested even when both lungs were involved. The promptness with which most of the patients responded to summons for repeated injections seemed conclusive evidence at least of the symptomatic relief which they enjoyed. This might have been credited in part to psychic influences had there not been a corresponding improvement in the objective signs revealed by repeated examinations. From their experience with the earlier cases, Robinson and Floyd advocate more frequent injections as a factor of paramount importance. Complete compression is more nearly attained and maintained. The fatalities were due to the unarrested progress of the disease, in certain of the more advanced cases, rather than to anything incident to the treatment.

"Pleural eclampsia" (Forlanini), or a reflex inhibition of the heart through vagus irritation from the pleura, must be regarded as a possible danger in artificial pneumothorax as it is after thoracentesis for any purpose, but it may be prevented by anesthetizing the pleura. Air embolism, from the direct introduction of gas into a pulmonary vein, should never occur if the technique described is faithfully observed. The most that these authors claim for artificial pneumothorax is that the disease may be arrested in a certain number of cases, although from the recent reports of Brauer and Spengler, it would seem that certain cases have been cured.

Esophagoscopy. A few years ago esophagoscopy was believed to be devoid of much danger, but we now know that, even with experienced operators, fatalities may occur, and we suspect that the mortality is by no means small. Jackson has collected from the literature 616 esophagoscopies for foreign bodies, with a mortality of 3 per cent., which probably represents the mortality in skilful hands in large clinics. In the hands of the rough, careless, or inexperienced physician, the esophagoscope is a dangerous instrument. In view of the difficulties and danger attending esophagoscopy for the removal of foreign bodies, the aid of an experienced laryngologist should be secured in all cases (Jackson), and, when it is impossible to secure such help, the older methods of removal by bent or straight forceps, without the aid of illumination, by pushing the foreign body into the stomach, are sometimes justifiable.

After removal of the body from the esophagus, if there is reason to believe that necrosis has already occurred, or that the esophagus has been injured during the extraction, the patient should be nourished by nutritive enemata for a few days. For relief of inflammation and wounds, Ingals uses a powder of 20 grains of bismuth subnitrate and 20 grains of calcined magnesia, moistened and given every three or four hours, with the hope of coating the whole injured or necrotic surface.

Jurasz¹ observed a case of extensive phlegmonous inflammation of the mediastinum and neck following attempted extraction of a bone from the upper portion of the esophagus. The mediastinum and superficial tissues were drained, a foreign body was not found, and recovery followed with the formation of a fistula which discharged considerable pus. Four weeks later the patient was readmitted to the hospital after a hemorrhage from erosion of the common carotid artery. The latter was ligated but the patient succumbed eleven days later from a cerebral abscess and basilar meningitis. The dangers of such methods are found in the fatal complication in the above case, all of which would most likely have been avoided if esophagoscopy had been performed.

Carcinoma of the Esophagus. Operative interference in carcinoma of the esophagus, particularly of the thoracic portion, is really only in the formative stage and thus far has been replete with disasters. Of 33 cases, 17 died as the result of operation, 12 patients developed recurrence, in 3 the result was not ascertained, and but 1 case has been free from recurrence for one and one-half years. The principal cause of the large number of unsuccessful cases lies in the incomplete character of the operations. Not only must the carcinoma itself be removed, but a complete block dissection should be made, including in the excision the trachea and lymph nodes. The latter lie along the esophagus as high as the bifurcation of the carotid artery, and in the supraclavicular fossa between the jugular and subclavian veins. In the selection of the cases, Winiwarter² would include carcinoma of the cervical portion of the esophagus, even if the general condition of the patient is not very good, when there are no metastases in the lymph nodes or other organs, and when the tumor is not palpable, or, if so, small and movable.

The plastic operations devised for formation of an artificial esophagus in case of malignant tumors of the gullet are of two types. In the first, a subcutaneous tube is formed from the skin of the breast, and this is connected with the cervical portion of the esophagus above, and the stomach or jejunum below. This operation is not satisfactory, because the food produces irritation of the skin. The second method consists in the transplantation of a loop of jejunum under the skin of the thorax, and anastomosing this with the esophagus above and the stomach below. The method has been used successfully by Roux, but other attempts have been unsuccessful because the intestine has undergone gangrene. To increase the resistance of the transplanted intestine, Ritter³ carried out a series of experiments by which he proved that after transplantation, the immediate ligation of the mesenteric vessels, particularly those at the distal extremity of the intestine, was followed by anemia

¹ Med. Klinik, 1912, viii, 1264.

² Wiener klin. Woch., 1912, xxv, 522.

³ Deutsch. Zeitschr. f. Chir., 1912, Band cxii, 559.

and gangrene of the gut. If the ligation was performed gradually, a single vessel at a time being tied, then intestinal transplantation up to 60 cm. in length, could be performed, and the gut maintain its nutrition. The circulation of the transplanted intestine is secured in part from the vessels that remain in the mesenteric pedicle, but more particularly from anastomosis formed between the intestinal vessels and those from the surrounding tissues.

Diverticulum of the Esophagus. A rather heroic plan of procedure was adopted by Zaaier¹ in a case of diverticulum of the lower portion of the esophagus. The operation, a description of which follows, was the first of its kind, and the preliminary stages were carried out without any disturbance of the respiration or of the circulation. A gastrostomy was performed as a preliminary step, and the general condition of the patient was improved by lavage of the sac, which was so large that the complete extirpation of the sac was determined upon. Four weeks later portions of the eighth, ninth, tenth, and eleventh ribs were resected from the left side of the chest under positive pressure, and after separating the lung from adhesions, the esophagus was exposed and detached from its bed for a distance of 12 to 14 cm. The dilated lower extremity was drawn out of the wound, sutured to the parietal pleura, and the muscle and skin wounds carefully closed. For the first two days the patient complained of dyspnea; on the twelfth day the esophagus was opened and a drainage-tube introduced. It was the intention of the author to complete the operation by establishing an anastomosis between the esophagus and stomach.

Cardiospasm. Of the theories which have been advanced to explain diffuse dilatation of the esophagus without anatomic stenosis, including primary atony of the musculature of the esophagus, the simultaneous development of cardiospasm and paralysis of the circular musculature of the esophagus brought about by degenerative changes in the vagi, congenital disposition, primary esophagitis, kinking at the hiatus esophagi, gross lesions of the esophagus or stomach, such as ulcer, carcinoma, and congenital or acquired asthenia, Plummer² attaches most importance to some disturbance of the nerve muscle-mechanism of the esophagus and cardia. He has treated 91 cases, of which 4 died; 73 were completely relieved of the dysphagia, and 11 improved. The majority of those cured have been free from symptoms for many years and several of the uncured ones have experienced long periods of complete relief. Erdmann³ admits that mechanical stretching may give relief, but if, after several sittings, the desired result is not obtained, a gastrostomy, followed by manual dilatation should be resorted to. To establish a diagnosis, it should be proved that the food comes from the

¹ Bruns' Beiträge, 1912, lxxvii, 497.

² Journal of the American Medical Association, 1912, lviii, 2013.

³ Surgery, Gynecology, and Obstetrics, 1912, xiv, 286.

esophagus and not from the stomach, as may be demonstrated by the use of the stomach tube and chemical tests, by the passage of sounds and bougies à boule, and by the use of the bismuth radiograph, and the esophagoscope. In the use of the bougie à boule, sounds and stomach-tubes, it should be noted with what freedom they pass the cardia one day and the difficulty or even failure that attends the attempt at the next sitting. That the symptoms of cardiospasm may be confused with those of pyloric obstruction was illustrated in one of Erdmann's patients on whom resort was made to a posterior gastro-enterostomy.

In the examination of patients with cardiospasm Lerche¹ prefers the esophagoscope. With this instrument the distance from the incisor teeth to the obstruction can be measured, the capacity of the esophagus roughly estimated, the shape of the dilatation observed, the presence of a diverticulum excluded, and the condition of the esophageal wall studied. The necessity of esophagoscopy in every case will at once be apparent when we know that the mucosa of the esophagus may be the seat of various lesions, such as ulcer, new growth, acute and chronic catarrh, or that the esophageal wall may be in a state of atony. The irritation from such lesions may cause recurrence of the spasm after the stretching, and the knowledge of their presence before treatment is instituted is essential. Furthermore, any attempt at stretching, without having first excluded other pathological lesions by the esophagoscope, might prove disastrous.

When marked sacculation is associated with cardiospasm, Myer and Carmen² believe that while a fairly complete symptomatic cure was possible, an anatomical cure seemed improbable. Even though after complete stretching and paralysis of the cardia, it is questionable whether any patient with sacculation would be found entirely free from symptoms, precautions should be taken as to the amount and character of the food taken. The sacculation seems to undergo but little shrinkage after the spasm has been overcome, so that the normal peristalsis of the lower third or two-thirds of the esophagus is either diminished or abolished.

Esophageal Diverticula. The entire length of the intestinal tract is subject to the formation of congenital, acquired, true, or false diverticula. These are considered in order by C. H. Mayo,³ but reference here will be made only to those occurring in the pharynx and esophagus. Rarely these pouches are connected with bronchial cysts, and another unusual type is found at the entrance of the trachea, possibly the atavistic remains from the bronchial pouch. Diverticula of the esophagus are not uncommon, and, when small, are frequently overlooked, and in advanced cases, when the bougie no longer passes the obstruc-

¹ American Journal of the Medical Sciences, 1912, cxliii, 415.

² Journal of the American Medical Association, 1912, lix, 1278.

³ Ibid., 260.

tion, and the patient is suffering from starvation, they are quite often believed to be malignant. In some cases, the true nature of the condition is discovered only when life has been prolonged by the aid of gastrostomy.

While extirpation of the sac may be accomplished in one sitting, especially if the sac is small, invagination of the sac with the esophagus, as is sometimes done, is not recommended. Mayo prefers an operation in two stages, particularly when dealing with large sacs extending into the mediastinum. At the first stage the sac is drawn out of the thorax into the neck, and, after the granulation process has closed the cellular spaces, the sac is removed.

Schmid's¹ method of drawing the sac out, raising the lower end and suturing it in the inverted position, has advantages of being a less formidable procedure than excision. With the mouth of the diverticulum at its most dependent portion, food cannot enter the sac, and in time the latter may be expected to undergo atrophy. Fischer² endeavored to carry out this idea in a case which was associated with carcinomatous degeneration of the diverticulum. The sac, in both cases he records, was tightly adherent to the surrounding tissues, the walls indurated and firmly attached behind the esophagus to the deep muscles in front of the cervical spine. In trying to free it, the sac was torn, and an esophageal fistula established itself, which, however, closed after a few weeks. Fischer advocates a preliminary gastrostomy as a means of nourishing the patient before and immediately after the operation, without interfering with the healing process. If, for any reason, operation is contraindicated, the patient can be made a little more comfortable by careful sounding and lavage of the sac. Even with this there is the risk of perforation, with infection of the mediastinum.

CONGENITAL OR CICATRICAL WEBS of the esophagus have been observed occasionally, but Mosher³ thinks they are not as uncommon as is usually believed. These webs may explain the symptoms of certain of the milder affections of the esophagus, which are often attributed to neurasthenia. The case which Mosher observed gave a doubtful history of having swallowed some caustic; there had been difficulty in swallowing for fifteen years, and the examination disclosed a thin web which surrounded the esophagus about one inch below the level of the cricoid cartilage. It was in the form of a diaphragm with a small central opening, and its nature was not recognized until the mechanical dilator was passed through its lumen and slightly withdrawn, when the diaphragm was stretched and its true nature became apparent.

Zeit⁴ classifies the CONGENITAL MALFORMATIONS OF THE ESOPHAGUS as follows: (1) Complete absence of the esophagus, its place being

¹ Wiener klin. Woch., 1912, xxv, 475.

² Archives of Diagnosis, 1912, vol. xxxvi.

³ Laryngoscope, 1911, xxi, 1089.

⁴ Journal of Medical Research, 1912, xxvii, 45.

taken by a muscular band stretching from the pharynx to the cardiac end of the stomach; (2) the termination of the esophagus in a simple cul-de-sac; (3) the termination of the esophagus in a cul-de-sac, the lower rudiment of the canal communicating with the trachea or bronchi; (4) a tracheo-esophageal fistula, the esophagus being otherwise normal; (5) a membranous obstruction of the esophagus; (6) the presence of esophageal diverticula; and (7) duplicity of the esophagus. While these congenital anomalies are rare, the third of the above groups is found most frequently and with such persistent uniformity in all its characteristic anatomical features as to suggest faulty embryonic development. The majority of cases are associated with other malformations, especially atresia ani; only 5 cases could be found in the literature in which this anomaly was found in an otherwise normal child.

Among the numerous cases of congenital stenosis which have been reported recently, are several by Morse,¹ who regards the outlook in this condition as absolutely hopeless. It is, of course, possible to do gastrostomy and keep the baby alive for a time by this means. This procedure can only delay the fatal termination, however, as there is no possibility of doing a plastic operation in the middle of the esophagus in babies of this age.

The symptoms and signs of pharyngeal diverticulum in a case reported by Waggert and Davis² were so well marked that the patient and his friends had made the diagnosis. The regurgitation of food, which increased with compression of the neck, was the most prominent symptom, and has occurred in all the cases on record. In the early stages, it is difficult to differentiate cases of diverticula from those of stricture without the use of the bismuth radiograph. The observations made at the time of operation in the above case, with the examination and microscopy of the sac, correspond in every detail to the description of the propulsion pouches which originate from some weakness in the esophageal wall, or from increased pressure within the esophagus.

THE SALIVARY GLANDS

Salivary Fistula. The treatment of salivary fistula is frequently attended by considerable difficulty, and often by absolute failure. A recent experimental and clinical study by Tait³ on "Fibrous Atrophy of the Parotid Gland" is especially interesting in this connection. The purpose of the study was to determine: (1) The results, immediate and late, of duct obstruction; (2) its role in the etiology and evolution in the

¹ Archives of Pediatrics, 1912, xxix, 485.

² Lancet, March 23, 1912, p. 786.

³ Surgery, Gynecology, and Obstetrics, 1912, xiv, 456.

treatment of tumors of the salivary gland; (3) its therapeutic value in some clinical conditions, salivary fistula in particular.

Three sets of experiments were carried on in dogs, cats, and rabbits. The first set consisted in double ligation and resection of 1 cm. of Steno's duct in either the inner, middle, or outer third; the resected tissue being tested for bacteria. It was found that the inner third of the duct was almost invariably free from bacteria, and, following the resection, the swelling of the parotid was inconsiderable and soon disappeared. The second set of experiments included ligation of the duct with resection; this resulted either in a fistula, or incomplete obstruction (stenosis) with a reestablishment of the patency of the duct. In these cases, there appeared a marked and persistent distention of the gland and duct, practically a reproduction of the condition prevailing in salivary concretions. In the third set of experiments a duct fistula was made in the outer third, and then treated by double ligation and resection of the duct in its inner third. There resulted an early swelling, gradually diminishing and disappearing. He recommends the induction of atrophic sclerosis of the parotid gland and resection of the duct in (1) duct fistula; (2) in the control of drooling, which accompanies certain types of facial paralysis; (3) as a preliminary or secondary step in extensive resection of malignant lesions of the face.

Mixed Tumors of the Salivary Gland. Last year I abstracted an article by Judd in which he discussed the experience of the Mayo clinic, and I might add to his paper the following by Wilson and Willis,¹ in which they review the pathologic aspects of these tumors, 56 in number. Statistical studies of the cases show that 66 per cent. of the tumors began before forty years of age, and 85 per cent. of them before fifty years of age. The average time between the onset of the tumor and surgical interference averaged six years and four months, showing that they did not cause sufficient inconvenience to the patient to make him seek operation early. They believe that the mixed tumor is the result of proliferation of the mesoblastic tissue, and no etiologic relationship could be traced with acute parotitis. The tumors, which grossly are hard, are usually benign, and those which grossly are soft are mostly found to be malignant. They append a very extensive bibliography.

THE JAWS

Prognathism. Very little mention is made in the text-books on general or even on oral surgery of certain deformities of the jaws, especially prognathism and receding maxilla. My attention was called to this subject recently by a report of bilateral resection of the jaw in a patient

¹ American Journal of the Medical Sciences, 1912, cxliii, 656.

with marked protrusion of the inferior maxilla. Harsha¹ operated upon the patient and removed a rhomboid section of the jaw in order to bring the teeth into apposition. The technique of the operation was as follows: A longitudinal incision was made beneath the border of the jaw, 2.5 inches long. The periosteum was detached throughout the circumference for more than 1 inch. The bone-cutting forceps and rongeurs were used cautiously until the inferior dental nerve was reached, which was isolated and held out of the way by a thread. The remaining portion of the segment was then cut out, and the fragments apposed by two wire sutures. The operation was repeated on the opposite side, and the teeth were wired so as to bring the articular planes parallel. He obtained union by first intention in the soft parts, and the patient reported that bony union was complete within four or five weeks, but the condition was not as satisfactory as it might have been, owing to the insistence of the patient on going home where the wires on the teeth were removed too soon by the home dentist, displacing the bone somewhat before union was complete. This necessitated the removal of two of the molars and the filling of two others. The patient's condition, however, was markedly improved, and the illustrations show almost entire correction of the deformity.

The amount of bone to be removed was estimated, with the coöperation of a dental surgeon, by the examination and measurement of plaster models and the *x*-ray plate, and certain estimated measurements which would bring the teeth into their normal occlusion. Following this paper is a summary of the dental aspect of prognathism which I will not abstract. An interesting paper was published on this subject by Babcock² in which a case was reported and the entire subject discussed. I did not abstract this paper in 1910 because of the space it would require, but mention it at this time to call attention to a field of surgical procedure which is often neglected.

CANCER

Cancer of the Mouth. A study of the cancer problem continues to occupy considerable attention, and the range of investigation has reached over many fields, but as yet nothing particularly fruitful has been produced. The parasitic theory seems to have lost some ground in recent years, although Leopold, of Dresden, reports rather positively upon some new blastomycetes. Ribbert, in the latest edition of his book, reaffirms his well-known "cell-tension" theory, and states that carcinoma originates as a result of subepithelial inflammation, which is caused by epithelial products and which diminishes the differen-

¹ Surgery, Gynecology, and Obstetrics, 1912, xv, 51.

² Journal of the American Medical Association, 1909, liii, 833.

tiation of the epithelium and liberates its proliferative growth. The cellular infiltrate has generally been believed to be the result of the epithelial proliferation, but Ribbert thinks it is the cause. Ribbert's theory is very attractive and easily brought in line with clinical observation, although much of the parasitic theory can also be reconciled to clinical observation. An enormous amount of work has been done in the study of the statistics of cancer, and all authorities seem to agree that the disease is distinctly on the increase. These statistics are somewhat confusing in their discussion of the influence of various factors, such as climate, occupation, heredity, etc., but, with the single exception of "chronic irritation," it would seem as though no other etiological factors were constant. I would especially refer to the interesting paper of Wile.¹ The report of the Commission on Cancer of the State of Pennsylvania illustrates strikingly the serious nature of this malady and the large proportion of cases in which the patient was given bad advice by the physician first consulted. In a certain proportion of cases the local site of the trouble was not examined, and, in about 15 per cent. of the cases, the patient was told to await the result of development or was given certain local applications or salves. It is apparent, therefore, that we urgently need to know the cause of cancer in order that its treatment can be placed upon a sound rational and scientific basis, but until this cause is discovered we must persistently emphasize that the removal with the knife is the only treatment possible in the majority of cases, and that, in order to make this removal successful, it is essential that the patient be operated upon at an early stage in the disease. If the laity could only be impressed with the importance of the early symptoms of cancer, or of the precancerous lesions, and if they would hold their physicians responsible for any delay that might ensue, much might be gained.

Cancer of the mouth would seem, from its superficial nature, to be easily recognizable in the early stages, and yet we find in the Pennsylvania records that in the case of the lip, one year and nine months was the average time lost after the first cancer symptoms, eight months the average time in the tongue, and one year and eight months in the case of the mouth. For years the importance of a chronic ulcer in the mouth or on the lip, the effect of leukoplakia, the danger of the irritation from an ill-fitting tooth plate or from the persistence of smoking when a chronic ulcer exists, have been held before the profession, but have often passed unheeded. I believe that no treatment is justifiable in carcinoma of the mouth except the operative one, if it be feasible, always remembering that in order to cure a cancer with the knife it is necessary to cut entirely around the primary growth and its ramification in the tissues. There is entirely too much discussion of a "recurrence," and I agree with Wainwright that it is a term invented

¹ New York Medical Journal, 1911, xciv, 1169.

by the surgeon in order to put the onus on Providence. Cancers rarely recur; they simply keep on growing, never having entirely been removed. I do not think we will make much progress in the treatment of this affection, until the cause of cancer is discovered, unless we operate upon the early cases in a most complete manner and refuse to operate upon the late ones, putting the responsibility, harshly, if necessary, upon any physician who has counselled delay.

Many forms of treatment have apparently been successful in isolated cases. Ewing¹ discusses the treatment of cancer on biological principles, especially in its inoperable forms. He very pertinently remarks that but little serious scientific effort is made to relieve in the advanced stages of the disease, and surgeons often even neglect the ordinary rules of cleanliness in dealing with the patient. He reviews the effect of bacterial toxins, serum treatment, treatment by serous exudates, by vaccination, etc., and, after a general survey of the present condition, states that the complexity of the problem seems to bar the hope that a specific treatment of cancer will shortly become of practical importance. He does suggest, however, that a combination of several methods may increase the palliative effects and even lead, in occasional cases, to a virtual cure of inoperable cancer. I will not discuss the action of the x-ray, of radium, or of the newer mesothorium and thorium X, except to state that, speaking roughly, their action is very similar, and that they are rarely justifiable as a primary treatment unless the operable period has passed. They are generally useless after a recurrence, but they may be used with great advantage in the after-treatment of cases operated upon especially where the cancer has been superficially situated.

I have abstracted the important literature upon carcinoma of the mouth each year, and have been impressed, and am further impressed this year, with the low percentage of cures obtained as a result of delay in operation. The immediate mortality from operation seems to be getting less, and most patients who now die from operation do so as a result of sepsis. For this reason, when it is necessary to enter the mouth, it is preferable, when possible, to divide the operation into two stages. The nodes should be dissected out first, and five or six days later the extirpation of the original cancer may be done. Beckman² reports that during the past three years there have been performed, in the Mayo clinic, 25 block dissections of the neck for malignant disease without an operative mortality. I am presenting an abstract of a few of the most important papers of the year, mostly to emphasize the foregoing remarks and to call attention to the infrequency of cure. There is nothing new in the way of operative technique, most writers

¹ New York Medical Journal, 1912, xevi, 773.

² Northwestern Lancet, January 15, 1912.

emphasizing the necessity for an extensive dissection of the neck as well as a removal of the primary cancer.

The treatment of the defect occasioned by the partial excision of the inferior maxilla has been a vexatious problem for many years. Various forms of prosthetic apparatus have been devised and considerable attention has been paid to the subject in Germany. The results are generally disappointing, and the deformity resulting from a partial excision of the lower jaw for carcinoma has deterred many patients and operators from undertaking the necessary radical operation. Stillman¹ proposes a curved truss of silver wire which is introduced at the time of operation and later replaced by a bone-graft. After suturing the mucous membrane of the cheek to the floor of the mouth or the side of the tongue, he inserts the ends of the truss, or bridge, into holes drilled into the bone, and sutures the skin flap over it, with provisional drainage at each end of the incision. The posterior opening usually closes promptly, but the anterior one takes time, and sometimes does not heal until a small sequestrum has separated from the maxilla. When it has finally healed, the wound is reopened, the truss or wires removed, and all granulation tissue scraped out, the ends of the bone freshened, the graft put in place and the wound sutured without drainage. He has evidently used this truss in a number of cases, and states that sometimes it has ulcerated through the skin, requiring removal, but the deformity was very much less than when no effort at all had been made to keep the ends of bone apart. This is especially so in cases in which it is necessary to remove the anterior or mental portions of the jaw. He uses sections of rib, with the periosteum attached, for the graft. McWilliams² transplanted a rib directly in one case; a boy, aged twelve years, was operated upon for a large giant-cell sarcoma of the left lower jaw, with removal of one-half of the bone. Fifteen months later the seventh rib was resected subperiosteally, and one end was fastened to the stump of the lower jaw and the other placed in a cavity in front of, and just below, the external auditory meatus. Two months later the rib had solidly united to the jaw in front, and there was no sign of any breaking down. McWilliams recommends, in these resections of the lower jaw, that an apparatus should be applied immediately after operation to hold the resected jaw in position, and that the defect should be allowed to heal entirely before an attempt is made to transplant a rib into it.

Cancer of the Lip. When affected by cancer, the lip stands midway between the skin and the tongue in point of gravity, and the results from operative treatment are far better than those involving the cavity of the mouth. Montgomery and Culver³ offer a new precancerous lesion for further observation. They believe that almost all epi-

¹ *Annals of Surgery*, 1912, lvi, 70.

² *Ibid.*, 377.

³ *Ibid.*, lv, 227.

theliomas of the lip develop as a consequence of seborrhea, which may be recognized at times with the naked eye, but in some cases only with the help of a low-power lens. If the lip is seborrheic, a line extends across the lip, about one-half centimeter above the cutaneous border, which is crusted, keratotic, or heaped up in horny, tightly adherent masses. The irritation of the pipe, the drying effect and irritation of the smoke and products of combustion irritate the sensitive lip of those having seborrhea. Other irritations, such as heat, cold, strong sunlight, and rude weather may have some influence, but they believe that the influence of external agents has frequently been exaggerated. When the condition is diagnosticated, it should be removed by the careful use of trichloroacetic acid followed by treatment with the x -rays. They also call attention to the deceptiveness of the depth of the infiltration of cancer of the lip, and believe that those cases reported as cured by the x -ray treatment had a very shallow infiltration. In regard to recurrence, they believe that such is possible because the carcinoma may arise from a point affected with seborrhea after a cancer is removed, unless the seborrhea, as well as the cancer, has been treated. Beckman¹ reports that, during the past six years, 210 cases of carcinoma of the lips have been operated upon in the Mayo clinic. Two hundred of these had the submaxillary and submental glands removed, but in only 52 did the patient come for operation within six months of the beginning of the disease. In spite of this fact, in 104 cases the glands removed showed that neither side was involved by carcinoma. The same difficulty has been encountered in their cases of carcinoma of the tongue, cheek, and mouth; a large proportion of the patients presented themselves at so late a period in the disease that little hope remained of permanent cure.

Cancer of the Tongue. The name of Sir Henry Butlin naturally arises in connection with any discussion of cancer of this organ, and a timely paper has appeared by Spencer,² which is a most interesting appreciation of the work of Butlin, and which describes the advances in our knowledge which took place coincidently with Butlin's own contributions. This paper should be read in the original to be appreciated; it is filled with practical points and many truisms, which, unfortunately, are often forgotten or neglected. Thus, he emphasizes the fact that both radium and light rays tend to excite the growth margin of true squamous-celled carcinoma, and to induce a widespread and rapid infection of the corresponding lymphatic nodes; this is interesting in view of the frequency with which this disease is treated by the x -ray or by radium. He emphasizes anew the necessity for the excision of any persistent patch or indolent ulcer, which may be considered as a precancerous lesion, if such lesion fails to heal in three weeks after

¹ Northwestern Lancet, January 15, 1912.

² British Medical Journal, July 20, 1912, p. 105.

the removal of a tooth, the cessation of smoking, the administration of anti-syphilitics, or any other form of treatment. He gives in detail Butlin's indications for the partial or complete dissection, and discusses the advantage of the two-stage operation for certain cases. Butlin operated upon 200 patients between the years 1881 and 1908, of whom 20 died of the operation and one was lost sight of. Of those who survived, 47 suffered from recurrence in the mouth, and 44 from recurrence in the glands in the neck without recurrence in the mouth; two died from a crossed infection of the glands on the opposite side of the neck; in one, the cancer reappearing on the opposite border of the tongue. One died of secondary infection of the lungs. In 8 cases, the operation was partial or was abandoned; 22 were alive and well, or had died of some other disease within three years of the operation, 6 being alive and well one year after the operation. There remained 57 who were alive and free from recurrence three years or more after the operation. In brief, Butlin obtained a definite success in one-third of his cases, with an immediate mortality of 10 per cent. In 70 cases, the disease in the tongue had been removed, and, in addition, the glands removed from the neck; of these, 6 died from the operation, and 24 were alive and well three years, or more, after the operation (42 per cent.). With these we may compare 54 cases in which the glands were not removed, and though they were, on the whole, less severe cases, yet, owing to the tenacity of glandular infection, only 12 were alive and well three years after the operation (29.26 per cent.).

He discusses the *treatment of recurrent cases*, and states that recurrence in the stump of the tongue, whether early or late, is generally unfavorable, and a further operation is usually contraindicated. Any diffuse or general infiltration contraindicates operation, but, if the nodes enlarge beyond the area previously dissected, a further free dissection in the neck may arrest the disease. Inoperable cases are relieved by painting with a 1 to 1000 solution of mercuric cyanide, painted on every four hours and followed by a mouth wash of hydrogen peroxide and potassium permanganate alternately. A complete bibliography of Butlin's contributions to the literature on diseases of the tongue is appended.

Caird¹ reviews 60 cases observed during a period of ten years. The factors concerned in the production of chronic irritation in these cases were mostly connected with the teeth, 27 of the 60 ascribing the disease to this cause. All of the patients used tobacco, only 4 acknowledged infection from syphilis, and leukoplakia was only noticed 3 times; 13 of the cases were inoperable, and, of the 47 operated upon, 7 died from the operation which in all cases was exceptionally severe, requiring ablation of the entire tongue, tonsils, portions of the pharyngeal wall, and the full depth of the jaw. Fourteen died within a year after the

¹ Edinburgh Medical Journal, 1911, vi, 5.

operation, and 3 others each within sixteen, twenty-eight, and thirty-six months. Eight cannot be traced, and 16 patients at the present time survive at varying periods of from one to eight years from the time of operation, although 10 of them have been living but twelve months. He performs the two-stage operation, with removal of the tongue first, followed in ten days by dissection of the neck. He performs the first stage of the operation under local anesthesia, of course, doing the Whitehead operation, although, in a few cases, the Symes operation has been done.

Riedel¹ reports the results of his operation for cancer of the tongue from 1883 to 1900. In all, there were 24 patients, 17 men and 7 women and, of these, 2 died from pneumonia shortly after operation, and 3 patients could not be traced. Of the remainder, 10 died during the three-year period from recurrence. He gives an interesting summary of the remaining 9 patients: One case operated on in 1884, with cancer of the tongue, did not develop recurrence until 1903, and died in 1907 from the original disease. Three patients died from other diseases eleven, sixteen, and seventeen years respectively after operation and without recurrence; 1 patient died of carcinoma of the rectum twenty years after the operation on the tongue. The sixth patient, operated upon in 1893 with removal of the right half of the tongue and the glands, which were found, microscopically, not to be carcinomatous, developed, two years later, a hard mass beneath the jaw, which was removed. The patient in 1912 was living and free from recurrence. The remaining patients, twelve, fifteen, and eighteen years after operation were living and free from recurrence. This report of Riedel's is a model which might well be copied by other writers. He tabulates the 9 cases succinctly so that at a glance one can get the gist of the paper.

Short² traced 29 patients operated on for cancer of the tongue at the Bristol Royal Infirmary during the years 1902 to 1911. There were two operative deaths, and 13 others died from weakness or recurrence. In 12 cases, in which the nodes were not dissected out, only 1 patient was cured, while of 17 cases in which the nodes were excised, there were 6 cures, and Short believes that even in the remaining 11 there is evidence that the patient was given relief and more chance of recovery.

Cancer of the Pharynx. The dreadful nature of this affection can best be appreciated by giving the results of an investigation conducted by Schumacher of 136 cases of cancer of the pharynx observed in the Zurich Surgical Clinic during the last thirty years. Sixty-one of these cases were reported in 1897 by Krönlein. The cases were divided into three groups: (1) Nasopharyngeal, 2 cases; (2) oropharyngeal, 53

¹ Deutsche. Zeit. f. Chir., 1912, cxvii, 302.

² British Medical Journal, April 20, 1912.

cases; (3) laryngopharyngeal, 81 cases. In the first group, one died five hours after operation, and the other was inoperable. Of the oropharyngeal group, the growth was usually situated upon the wall of the pharynx, especially involving the mucous membrane around the tonsil, frequently at the base of the tongue. In 6 cases it involved the velum; 22 were inoperable, and, of the remainder, 7 died from operation, 19 suffered and died from recurrence, 2 died of some intercurrent affection, 1 was operated upon for a primary carcinoma of the larynx, 1 remained free from recurrence for five years and died of some cerebral affection, and one patient is living, ten years after operation, without recurrence. Of the laryngopharyngeal group, 63 were considered as inoperable, and, of the remaining 18, 10 died at the conclusion of operation. Of the remainder, 1 died two years and two months later from apoplexy, 2 patients were living in 1910 without recurrence, six years, and three years and eight months respectively after operation, and the remaining 5 died from recurrence, two to twelve months after operation. It will thus be seen that the total immediate mortality in the 59 operative cases was 35 per cent.; 25 of the 32 patients leaving the hospital in good condition died of recurrence within one year; 5 died in less than four years; and only 3 of the total 136 patients survived for more than five years, and 1 of this group died in the tenth year from recurrence in a gland. The survival of an average of seven months scarcely compensates for the severe mutilating operation, and the patients do not have time to become accustomed to the consequences of operation before the recurrence is on them. In conclusion, Schumacher observed that it is useless to operate upon such cases unless they are seen early by the surgeon, and unless the most radical operation possible is performed.

Steward¹ reports a case of excision of an epithelioma of the lower end of the pharynx, which is interesting to record because of the unusual nature of the operation and the value of further publication of his technique. The patient suffered from a growth involving the anterior and left lateral aspects of the extreme lower portion of the pharynx, which caused pain and difficulty in swallowing. Operation was begun by an angular incision reaching from the thyrohyoid membrane to the left sternomastoid muscle, and thence downward. The depressor muscles, the thyrohyoid membrane, superior cornu of the thyroid cartilage, and the left lateral wall of the pharynx were divided. The left lobe of the thyroid gland was then removed in order to give more room during the later stage of the operation. By tilting the larynx over to the right and drawing the sternomastoid muscle and carotid vessels backward, the site of the growth was brought well into view. It was excised, together with a margin of healthy tissue about three-quarters of an inch wide. This involved the removal of the whole

¹ *Lancet*, February 17, 1912, p. 431.

circumference of the esophagus, with the exception of a narrow strip of its right posterior wall, and exposed most of the posterior surface of the cricoid cartilage and the upper three rings of the trachea. Cat-gut sutures were then used to bring together the thyrohyoid membrane, the upper part of the pharyngeal incision, the muscles and the transverse limb of the skin incision. A soft rubber feeding-tube was then passed from the lateral incision into the esophagus, fixed in position by a suture, and packed around with gauze. In three weeks the tube was replaced by one passing through the nose, the wound in the neck being allowed to granulate. This tube was kept in place for ten days; it was then removed, and bougies passed daily. A cicatricial stricture resulted, and the upper end of the esophagus was reopened through the neck and a tube introduced. Three weeks later considerable dilatation of the lower end of the pharynx occurred, and the stricture became amenable to dilatation by bougies.

Cancer of the Larynx. I have not discussed this subject since 1910,¹ at which time I abstracted a number of important papers on the subject. In cancer, the *ultimo ratio* of the knife still offers almost the sole hope of cure; but, unfortunately, the great majority of these so operated on succumb because of the advanced state of the disease at the time of operation. Cancer of the larynx is peculiar in that we have a favorable form, the *intrinsic variety*, and an unfavorable form, the *extrinsic cancer of the larynx*, the latter, in the words of Sir Henry Butlin, being "a dire disease." Extrinsic cancer requires the ruthless sacrifice of the larynx and its surrounding structures, but, in the intrinsic variety, the operation known as laryngofissure seems to have a field of successfulness. Thomson² reports 10 cases operated on by this method, with no operative deaths and a lasting cure in 80 per cent. of cases. The technique is well known, having been established by Semon and Butlin, and the report is interesting because of the excellent results obtained by the operator.

Sarcoma of the Tongue. This rare disease seems to be most difficult to differentiate from syphilis, tuberculosis, macroglossia, and chronic glossitis. Foote³ reports a case which is interesting for two reasons: In the first place, the diagnosis was exceedingly difficult clinically, and four pathologists who examined the excised portions were also unable to come to any agreement, although the diagnosis of sarcoma of the tongue was finally made. The second point of interest was the treatment; the patient had 14 injections of the mixed toxins of prodigious and erysipelas, a full dose of salvarsan and injections of pyoktanin, but no results whatever were obtained from these methods of treatment, final cure apparently being obtained only by continuous removal

¹ PROGRESSIVE MEDICINE, 1910, xii, 60.

² British Medical Journal, February 17, 1912, p. 355.

³ American Journal of the Medical Sciences, 1912, exl, 198.

of the tongue until practically the entire organ had been removed. Foote appends a list of 48 cases from the literature, with the comment that their classification is impossible from the character of the reports. I strongly indorse his objections to the common comparison of tumors with various objects of nature such as oranges, eggs, nuts, oysters, beans, etc., a habit which is not only ridiculous and unscientific, but extremely inaccurate. In one of these cases, a tumor as large as an orange in the dorsum of the tongue was described, although it is quite evident that the mouth will not contain an orange.

THE CERVICAL LYMPH NODES

Tuberculous Lymphadenitis. It is not so very long ago that the treatment of this affection seemed to be definitely settled by the general understanding that excision of the affected nodes offered the best prospect of cure. Of late, however, the *x*-ray and tuberculin enthusiasts have been insistent upon the advantages of these methods of treatment and the most enthusiastic claim that no other treatment is permissible. The art of therapeutics is ever changing, the attack upon disease shifts from one point to another, but in the end real progress is made. The point which we are apt to overlook is that each individual patient requires particular attention, and that generalizing is fatal to progress. As Hawes¹ puts it, "the broad-minded physician will not claim that surgery alone, hygiene alone, or tuberculin alone will cure tuberculous adenitis, but he will use each and all of these three methods of treatment according to the needs of the individual patient. Above all he will remember that he is not only treating a case of tuberculous glands, but he is dealing with a human being infected with tuberculosis."

The conservative treatment of tuberculous nodes of the neck has been advocated by various writers for some time. Four years ago I² abstracted Parker Sims' paper, in which he claimed that a large majority of patients may be safely and successfully treated by hygienic measures, as in other tuberculous affections. He advocated the use of ichthyol ointment, and only operated in the presence of persistent enlargement, caseous degeneration, or abscess formation. In the same article, I quoted Pottenger as being skeptical as to the value of surgical treatment. He stated that cure depends on the immunizing property of the blood. But this disease is peculiar in the fact that the nodes are infected from some primary focus, some portal of entry in the area which drains into the nodes, and it is also well known that the lymphatic mass in the neck is more or less isolated from the general lymphatic and vascular system; it will be remembered that Judd³ stated that

¹ Boston Medical and Surgical Journal, 1912, clxvi, 80.

² PROGRESSIVE MEDICINE, 1909, No. 1, xi, 59.

³ Annals of Surgery, 1910, lii, 758.

owing to the anatomical arrangement of the nodes and vessels, direct extension from the cervical nodes into the mediastinum was impossible. The disease is thus a local one, and can be effectively dealt with by the removal of the affected focus and eradication of the disease in the neck by a more or less radical dissection. Some years ago, Dowd¹ stated that this form of tuberculosis is not especially well suited for hygienic, climatic, and medicinal treatment. In his most recent article² he strongly advocates operation, owing to the likelihood of prolonged suppuration, debilitating the child, and spreading the infection to other parts of the body. He has operated upon 465 cases, with one death. Jopson,³ who has had a large experience with children, is also a strong advocate of the radical operation, believing that its results constitute the strongest argument for its employment. Sutcliffe⁴ believes that if a patient is properly treated by rest, fresh air, and diet, before caseation has taken place, operative or vaccine treatment will seldom be required. On the other hand, if the nodes have existed for more than six months, it is probable that caseation has already begun, and that operation will sooner or later be called for. The objections to operation seem to be based (1) on the disfigurement caused by the scar; (2) on the possibility of injury to important nerves and muscles; and (3) on the matter of recurrence. While it is perfectly true that disfiguring scars may result, yet, in my experience, these are almost invariably the result of delay in performing the operation or of involvement of the skin by the tuberculous or inflammatory process. If one operates early, and especially if one uses the transverse incision in the crease of the neck, the scar is insignificant, but if the case is allowed to go on until extensive caseation, with involvement of the sternomastoid or other muscles, has resulted, the scar will be disfiguring. One might just as well argue against the performance of operation for appendicitis because of the occurrence of incisional hernia, which may easily result in neglected cases where the abdomen has been left unsutured owing to drainage. As to the second point, the nerves that may be injured during the operation are the hypoglossal, the spinal accessory, the cervical branch of the facial, and certain other of the superficial cervical nerves. The hypoglossal or spinal accessory should never be injured if the dissection is properly performed, although occasionally, in the most advanced cases, it may be impossible to locate these nerves, but this must happen very rarely indeed; the other nerves are frequently divided, but the resulting paresis is always slight, and does not last beyond a few weeks. There is no necessity for the division, removal, or injury of any muscular structure unless it is hopelessly involved

¹ Surgery, Gynecology, and Obstetrics, March, 1909, p. 32.

² *Ibid.*, 1912, xiv, 353.

³ International Clinics, 1907, vol. iv, seventeenth series.

⁴ Practitioner, 1912, lxxviii, 641.

by the morbid process. It seems to me that this objection is not well-founded unless one considers bad operating as a contraindication to operation. As to recurrence, I am unable to furnish any figures of my own. It suffices to quote from Dowd who cured from 83.9 per cent. to 98 per cent. of his patients, depending on the type, and had to reoperate on only 47 of 275 cases (16.7 per cent.), the majority of which were extensive infections. Stone¹ states that the recurrence after radical excision is due to the failure to recognize and remove the primary foci of infection or the vulnerable points of entrance. He discusses the subject under three headings: (1) The importance of the various sources of infection; (2) the time and indications for surgical interference; and (3) the manner of the interference in particular cases.

THE SOURCES OF INFECTION. The most common source of trouble lies in the tonsils or in the nasopharynx, and the nodes most commonly involved are those which receive the lymphatics from those points, viz., those that lie a little below and behind the angle of the jaw, and immediately in front of, or under, the anterior edge of the middle of the sternomastoid muscle. It is not easy, in most cases, to locate whether the primary focus is in the faucial tonsils or in the adenoids. But Stone believes that the tonsils most frequently are the infecting focus, because the nodes most commonly involved are those in front of the sternomastoid muscle; but he states that enlargement of the adenoids is fully as common as is tonsillar hypertrophy, which means simply that the tonsils may be the seat of serious infection without much enlargement or marked local manifestations. Last year I quoted from Osborne² who showed that enlarged nodes occurred rather more frequently with enlarged adenoids than with enlarged tonsils.

An interesting article was published in 1910 by Mathews,³ in which he discusses the responsibility of the tonsil in tuberculous adenitis. This paper was not abstracted by either Dr. Kyle or myself. He examined 57 tonsils removed for a variety of reasons, and embracing all types of tonsils, in which there was no reason to suspect tuberculosis in the neck or other part of the body; none showed tuberculosis on microscopic examination, and he believes one may assert that the tonsil is not likely to harbor the tubercle bacillus without other manifestations of tuberculosis in the body. On the other hand, of the 8 patients with cervical adenitis, the tonsils were tuberculous in 5; he believes that the tonsils should be removed in cases of cervical adenitis, although he acknowledges that a number of cases are cured by the removal of the nodes alone, which simply proves that we do not cure cervical tuberculosis by removing every single bacillus and lesion, but

¹ Boston Medical and Surgical Journal, 1912, clxvii, 537.

² PROGRESSIVE MEDICINE, 1912, No. 1, xiv, 55.

³ Annals of Surgery, 1910, lli, 753.

by reducing the load of infection with which the body has to contend. Stone describes the course of the lymphatic drains by means of which knowledge of the primary focus can practically always be traced and removed or treated. Thus, the lymphatics in front of, and above, the auditory canal lead to the pre-auricular nodes, and they become enlarged from any infection of the forehead, an eczema or intertrigo in the crease between the scalp and ear, a furunculosis of the anterior wall of the auditory canal, etc.; usually the infection is pyogenic, occasionally tuberculous. The central portion of the face, roughly from above the outer corner of the mouth, and from below the outer corner of the eye, drains into nodes situated about the facial artery and vein in front of the angle of the jaw; fissures and sores about the nostrils, and about the corner of the mouth and eye, and irritations within the nose may cause their enlargement. The lymphatic vessels from the lower lip and chin drain into the submaxillary nodes behind the symphysis of the jaw. The scalp drains into a group beneath the occiput, and the middle ear, mastoid, and overlying tissues drain into a group under the mastoid. Infection of the gums or bone about the roots of the teeth passes from the upper jaw to the nodes at the angle of the lower jaw, and from the lower jaw directly into the submaxillary nodes.

In regard to the portals of entry, I might call attention to the observation of Most¹ who believes that the teeth, throat, and nose are rarely the portals of entry; patches of eczema, sores, cracks, etc., especially those near the angle of the mucosa and skin, being a much more important source. Dowd's experience, however, agrees with Stone in that 81 per cent. of his cases showed infection of the pharynx, tonsils, and posterior part of the mouth. Dowd,² in an address before the Clinical Congress of Surgeons of North America, in November, 1911, described some interesting differences between the disease in children and that in adults. There were only 15 cases in his series below the age of two years, and these children showed less power in resisting tuberculosis than the other groups; they suffered from complications of various kinds, among which were retropharyngeal abscess, tuberculous adenitis, spinoventosa, lupus of the forehead, and phlyctenular ophthalmia. He believes that cases of this kind have led to the opinion that neck tuberculosis is only one manifestation of general tuberculosis, but he believes that this opinion cannot be held after a study of the far larger group above two years of age.

THE INDICATIONS FOR OPERATION. It is not easy to indicate clearly those cases which require operation and those which should be treated by other means. In 1911, I abstracted Bennett's³ excellent article, in

¹ Deutsche. Zeitschrift f. Chir., Band xevii, S. 294.

² Surgery, Gynecology, and Obstetrics, 1912, xiv, 353.

³ PROGRESSIVE MEDICINE, 1911, No. 1, xiii, 29.

which he discussed the treatment under the headings: (1) During the primary adenitis; (2) during the stage of bacillary infection; (3) during the stage of softening and suppuration; (4) after caseation and calcification. He stated that during the first stage treatment should be directed to the focus of infection, unless suppuration occurred; during the second stage, the treatment should consist of tuberculin, open air, and climatic methods, and the traditional treatment by drugs and specialized nutrition; when softening occurred, he believed that operation was always indicated, and was strongly opposed to the injection of iodoform or other medicaments; and, finally, that calcified masses should be removed.

Judd outlined the following method of treatment: (1) Clear the throat of the adenoid tissue and tonsils, and attend to the teeth and nose; the administration of tonics, especially the syrup of ferrous iodide, and outdoor living constitutes the remainder of the treatment. He believes that many of the cases in the hyperplastic stage, or, as Bennett would say, during the period of bacillary infection, are cured by these measures. After caseation occurs, Judd removes the infected nodes and drains the wound. If, in spite of treatment, the nodes continue to enlarge and other glands become involved, he performs a complete excision; in the presence of a discharging sinus, he cures the softened mass, and swabs the wound with equal parts of tincture of iodine and carbolic acid, and when the sinus heals a radical operation is done, if necessary.

Stone is much more radical in his advice; he asks, "what can be gained by delay? The possibility of arrest or, if a mistake in diagnosis has been made, of cure; the probability of caseation of the entire gland to spread into the surrounding tissue, with the necessity of surgical interference under most unsatisfactory conditions, or the tedious natural discharge through a chronic sinus." He does not minimize the value of hygienic treatment or the value of resistance, but emphasizes the fact that encapsulation of a tuberculous foci does not cure the disease which remains as a smouldering fire ready to flare up if the proper conditions of trauma, fresh infection, or decreased resistance arise.

I quite agree with his position that when tuberculous cervical lymphadenitis is diagnosticated, the removal of the infected glands before caseation is easy, safe, uncomplicated, and *curative*. After caseation has occurred, it is often difficult, complicated, and possibly not at once curative. I am of the opinion at the present time that the use of tuberculin or the x-ray, together with the other hygienic measures necessary for the treatment of this disease, while frequently curative, is most often palliative, and that the majority so treated ultimately come to operation. Another point not sufficiently emphasized is the length of time required for treatment by these agencies. Thus, Hawes, in his excellent paper on the treatment of 56 cases with tuberculin, frequently

refers to months (see Case XI; "under treatment thirty-one months") in the treatment of his cases, and even then he describes apparent cures where the glands are "practically gone." One should also remember that these patients are seen weekly, that their lives become much more regular, and their hygiene improved; they are instructed to take one quart of milk a day, if under weight; and are urged to sleep outdoors. He advises operation when, after a prolonged and thorough treatment with hygiene and tuberculin, enlarged glands still remain, or when glands break down and become fluctuating. Bennet does not believe that tuberculin does much good, and thinks that many cases of recovery are due rather to the better hygienic conditions and to the quality and abundance of food with which the patient is supplied. Sutcliffe states that the cases in which apparent benefit has resulted are precisely those cases that would have recovered equally as well without it, and that the observation of children treated with and without tuberculin revealed no perceptible difference in the rate of absorption of the affected nodes. Sutcliffe insists upon the importance of rest in the treatment of the early cases, and believes the ideal method is to put the child to bed on a veranda with a good sunny aspect, and to keep him there night and day until the nodes are definitely diminished in size; or to send him out of doors all day in a chair. He keeps the head and neck as still as possible by bandaging firmly over a large pad of absorbent cotton, which makes a more comfortable method of fixation than the splints and collars that are sometimes ordered. But here, again, we must note the time element. He believes that a stay of from six months to two years is required if a more or less lasting immunity is to be acquired.

The action of the *x*-ray in these cases is still uncertain because of the unfortunate habit which some radiographers have of exaggerating the "magical" properties of the rays, and in misstating results of surgical treatment. Thus, Strunsky¹ reports one case, and then concludes that a scientific trial of the *x*-ray treatment is imperative in every case of tuberculous glands of the neck. He refers to the beneficial effect of the *x*-ray upon lymphatic structures, and believes that the ray inevitably destroys the function of the lymph nodes. He does not mention the earlier statement of Edsall that *x*-ray therapy has a powerful, and sometimes dangerous, influence on metabolism, especially in children. Dorrance² states that he has never "had any marked results from the use of tuberculin" and that "the Röntgen ray has given such uniformly good results that it is apparently the method of choice," and that "radical surgical operation has fallen into disuse." He makes the latter assertion because of the appearance of paralysis of muscles, injury to nerves, the large number of recurrences, and the

¹ New York Medical Journal, 1912, xcvi, 743.

Pennsylvania Medical Journal, 1912, xvi, 14.

general want of success attending operations; but, as I have said earlier in this article, bad surgery is not a contraindication to operation, and if a surgeon does not know how to operate for tuberculous glands in the neck, or if he gets his cases too late, he may get results which will turn him into various other methods of treatment. Stone has this to say upon the subject, "the *x*-ray is of value in some conditions. When the skin is involved, the *x*-ray is distinctly curative, and is by all means the best method of treatment. With sinus formation, the *x*-ray is helpful, especially when the sinus is superficial. With deep tuberculous nodes under sound skin, the *x*-ray ought not to be used, as other methods of treatment are infinitely preferable."

It seems to be the general consensus of opinion that, during the stage of softening and supuration, surgical interference is required. If the softened tissue is still confined by the capsule of the node, it may be possible to dissect out the mass intact, although it is common experience to buttonhole the capsule and have some escape. But, if such occurs and the wound is mopped out with tincture of iodine or with Harrington's solution, or, as suggested by von Eiselsberg, with boiling water, no deleterious effects will be observed. If the broken-down contents have perforated the capsule, formal dissection is not feasible, and the diseased part should be thoroughly removed by scraping, etc. But the operator should be sure that he has not simply incised into the pus cavity, leaving behind a diseased and partially broken-down node, because such a happening produces a long-lasting sinus. Furthermore, in such cases there need be no hurry about operation, which may be delayed until fluctuation can be felt, but not until the skin is involved. Mutschenbacher,¹ who seems to have seen a large number of cases in his service at Budapest, treats such cases by *aspiration* of the contents of the abscess through the smallest needle possible, and the injection of a few cubic centimeters of *iodoform glycerin*. The aspiration is repeated every third or fourth day, and the cure is generally completed by the fifth or sixth puncture, with no scar.

THE MANNER OF INTERFERENCE IN PARTICULAR CASES. I believe that when enlarged lymph nodes are definitely decided to be tuberculous, and when the primary focus has been removed or treated, radical excision is always advisable. Of course, the condition of the patient must be taken into account, and, if weak and anemic, it may be necessary to give some preliminary treatment, mostly consisting of rest, improved hygiene, diet, and fresh air, to which might be added tuberculin if the services of an expert in this form of therapy are available. The dissection of the involved mass should be thorough, but I agree with Stone that complete dissection, with the removal of all the cellular tissue, is not so important. I prefer the incision of Dowd.

¹ Beiträge z. klin. Chir., 1912, Band lxxx.

and think that it is rarely necessary to perform so extensive an operation as that described by Judd.

In 1905, I abstracted an article by Dollinger,¹ in which he advocated the so-called *subcutaneous operation* for the removal of these nodes. Recently, Frank² reported 8 cases treated by this method. He commences the incision behind the ear on the level with the external auditory meatus, and continues along the hair line for 2 to 2.5 inches. The skin is then dissected away until the glandular enlargement is reached, and the extirpation is then commenced. This, at times, is easy of accomplishment, but may be very difficult, requiring a great deal of patience, especially when the diseased nodes are adherent. Vessels, nerves, or muscles are pushed aside with the fingers or some dull instrument. Drainage is almost invariably used, and he claims that the scar is scarcely visible. In my review of Dollinger's paper, I called attention to the danger of this method when the nodes were situated along the course of vessels and nerves, and, in the discussion of Frank's paper, Buford called attention again to this very point, but Frank, in closing the discussion, stated that he had had no trouble in avoiding the vessels. Ochsner was quite enthusiastic about the method. One important point was brought out in this discussion, and that was the fact that even if the scar in the neck is small, it branded the patient with the diagnosis of tuberculosis, but, in these days when tuberculosis is becoming more and more curable, the point is not so well taken as was formerly the case.

When mixed infection has occurred and the trouble is too acute for incision, the neck should be poulticed until a well-defined abscess is formed, and this should then be opened, but delay is not justifiable if the infection is extending down to the deep tissues of the neck, or if there are symptoms of septic absorption. As Stone puts it, "the aim should be either to remove the gland or to drain an abscess." In children, one frequently finds caseous glands high up beneath the parotid, and, in such cases, the proximity of the facial nerve should be remembered, although, as a rule, the nodes are superficial to the parotid gland. In most cases in children, the spinal accessory nerve is more or less completely surrounded by the affected nodes, and it can almost invariably be saved from injury if the anatomy of the part is understood and care taken not to remove the nodes in this region in one mass. If, by any unfortunate chance, the nerve is cut, immediate suture should be performed. Particular care should be taken not to injure the nerve on the inner side of the sternomastoid. In those cases of widespread infection involving most of the nodes on one or, not infrequently, on both sides of the neck, the condition of the patient should be carefully estimated, owing to the possibility of tuberculosis

¹ PROGRESSIVE MEDICINE, 1905, No. 1, vii, 80.

² Illinois Medical Journal, 1912, xxi, 48.

elsewhere in the body. Surgical interference, in such cases, should be very conservative or very radical. The manner of dealing with caseous or softened areas is well known, and has been referred to previously.

The *after-treatment* of these patients is of particular importance. While operation may remove at one stroke the infected tissue, yet the patient's resistance to tuberculosis is generally below the normal, and should be increased by the various measures at our command; these need not be discussed, except to state that I think tuberculin may be of service in the postoperative treatment, and that x-ray applications are of decided benefit in those cases in which the skin has been involved, when sinuses exist, and when hypertropic scar tissue develops.

Hodgkin's Disease and Sarcoma of the Cervical Glands. The exact pathology of Hodgkin's disease has never been cleared up, and it has been associated with tuberculosis and sarcoma in the neck in the minds of many writers since its original description. The confusion with tuberculosis was brought about by the paper of Sternberg, in 1898, who asserted that a peculiar form of tuberculosis of the lymphatic apparatus and Hodgkin's disease were identical. He was supported by other writers, but was opposed by numerous others, among whom may be mentioned Longcope and Dorothy Reed in this country. It is probable that hyperplastic tuberculous lymphadenitis may present a histological appearance resembling Hodgkin's disease upon superficial examination, but there seem to be no definite relation between the two. In the case of sarcoma, we are all familiar with the views of Coley who, in several papers, has asserted that Hodgkin's disease is a type of sarcoma with histological features so closely resembling each other that, if a given specimen be examined by different pathologists, opinions would be equally divided between Hodgkin's disease and sarcoma. Of course, this idea is not new with Coley, as Billroth believed that Hodgkin's disease was of malignant nature, and called it malignant lymphoma, but a large number of recent writers look upon them as distinct maladies. Blackford¹ reports the cases of Hodgkin's disease, and of sarcoma primary in the cervical glands operated upon in St. Mary's Hospital (Mayo Clinic) between March 1, 1907, and September 1, 1911. There were 43 cases, of which 15 were classified as Hodgkin's disease, 14 as lymphosarcoma, and 14 as various other forms of endothelioma and sarcoma. They accepted the histological picture described by Reed in the diagnosis of Hodgkin's disease, and called attention to the difference between the inflammatory-like endothelial proliferation, and the rarity of giant cells in the lymphosarcoma, but they stated that early clinical differential diagnosis between chronic adenitis, tuberculosis, Hodgkin's disease, and lymphosarcoma is practically impossible. In the analysis of their cases, we find that Hodgkin's disease occurred at the average age of twenty-eight and six-tenths

¹ Surgery, Gynecology, and Obstetrics, 1912, xlv, 34.

years; while lymphosarcoma occurred at the age of forty-one and seventenths years; or, as they expressed it, Hodgkin's disease is more common before the age of thirty-five years, and lymphosarcoma is more common after the age of thirty-five years. It is also interesting to record that the expectancy of life after the onset of the disease may be relatively placed at three years for Hodgkin's disease, and about twenty months for lymphosarcoma.

The statement that certain swellings in the neck cannot be differentiated one from the other, indicates the absolute necessity of early removal of such swellings for microscopic diagnosis in anticipation of performing the more radical operation in sarcoma or tuberculosis. Hodgkin's disease is probably not amenable to surgical treatment, but, with the diagnosis established, much can be done by x -ray treatment.

CERVICAL RIBS

The occurrence of this anomaly was known to Galen, and, as far back as 1742, Hunauld described a case. In 1869, Gruber published the first compilation of the recorded cases, and since then many additional reports may be found scattered through the literature, indeed, considering the simplicity of the subject, it seems surprising how much attention the anomaly has excited. In 1907, Keen¹ collected 42 cases that had been operated on from 1861 to 1906. I have casually referred to a few of the case reports in *PROGRESSIVE MEDICINE* in 1906, 1907, 1909, and 1911, and have recently examined the entire literature during the past six years. Over 80 cases have been reported during this time, 30 of which were subjected to operation. I will not give space to the bibliography or mention the statistics in detail, although, in a few particulars, the data differ from those previously published. Most writers quote from Beck that in 67 per cent. of cases the anomaly is bilateral, but I find that, in the later cases, fully 85 per cent. are bilateral; whether the more general use of the x -rays or better technique in the application of the rays is responsible for this, I am unable to say. Scott² emphasizes that the following points should be observed in the taking of skiagrams in these cases: "(1) There should be no rotation of the bodies of the cervical vertebræ. (2) The tube must be accurately centred, the focal ray passing through the thyroid prominence of Adam's apple; this brings the centre well above the clavicle. (3) The plate should be in close apposition with the cervical spinous processes. This is not always easy, on account of the prominence of the occiput; (4) No movement of the patient—the patient holding his breath during the exposure."

¹ American Journal of the Medical Sciences, 1907, cxxxiii, 173.

² British Medical Journal, August 13, 1912, p. 483.

As to sex, my statistics agree with the well-known fact that the anomaly is met with in women three times as often as in men. Howell¹ believes that the symptoms may have been brought about by certain arm movements peculiar to women, or that the thoracic type of respiration has an influence.

About 70 per cent. of my collection of cases have occurred between the ages of twenty and forty years. There is mention made of a child, aged five years, by Henderson,² who was operated on in the Mayo clinic for the disfigurement caused by the mass in the neck, and a boy, aged seven years, with bilateral cervical ribs is reported by Barling.³ The oldest reported case is one by Waring, a man aged sixty years; one of Howell's patients was aged fifty-four years, although Ritkowski and Keen reported anomalies in patients who had passed the half-century mark. These indicate the time the patient came under observation, the symptoms being present for some time previous, and, in many of the adults, the symptoms date back to childhood.

The anatomical and embryological facts relating to cervical ribs are quite interesting, but need not be referred to here. The recent papers of Keen, Howell, Miller,⁴ Goodhart,⁵ and Henderson are accessible, and discuss the subject in detail. Recently two investigations have been carried out. Todd⁶ publishes a very interesting anatomical paper based upon the dissection of the shoulder region in three subjects with cervical ribs. He divides the ribs according to length into 4 groups, those showing markings for the veins, artery, and nerve; of the artery and nerve; for the nerve only; and for none of these, the first complete rib showing the marking for the artery. He believes that current teaching is probably correct on the raising of the artery by a seventh cervical rib, but Jones,⁷ in 1911, states that the artery is not so elevated, and that it is difficult to determine if we are dealing with a developed cervical rib or a rudimentary first rib.

Symptoms. The clinical symptoms are without exception referable to pressure upon the roots of the brachial plexus and the subclavian artery. As a rule, the symptoms develop gradually, but the onset may be abrupt (2 of the 80 in my series), and is sometimes referable to trauma. In a case recorded by Bird and Smith,⁸ the symptoms dated from an injury to the clavicle, the x-ray disclosed a rudimentary cervical rib, but it could not be determined which affection caused the symptoms. Bernhardt⁹ reports a similar case.

¹ Lancet, June 22, 1907, p. 1702.

² Northwestern Lancet, January 1, 1912.

³ British Journal of Children's Diseases, 1910, vii, 108.

⁴ American Journal of the Medical Sciences, 1911, cxlii, 811.

⁵ Ibid., 1909, cxxviii, 666.

⁶ Journal of Anatomy and Physiology, 1912, xlv, 244.

⁷ Ibid., 1911, xlv, 249.

⁸ Australian Medical Journal, 1910, xv, 343.

⁹ Berlin. klin. Woch., 1909, Band xlv.

The symptoms consist of nervous manifestations (pain, analgesia, etc.), especially involving the distribution of the eighth cervical and first dorsal roots; neuromuscular disturbances (loss of power, wasting, etc.), generally attributed to compression of the nerves; vascular phenomena, especially pulsation above the clavicle simulating aneurysm. In addition to the milder symptoms of coldness, paleness, etc., grave nutritive changes may be observed. I have records of 3 such cases. In one, reported by Russell,¹ the symptoms began with numbness in the fingers of the right hand, with alternating cyanosis and whiteness. As a result of using carbolic acid the fingers became gangrenous. The *x*-ray showed an undeveloped first thoracic rib. The fingers, and later the arm, were amputated, and the patient later committed suicide. A postmortem examination showed the subclavian artery distal to the thyroid axis to be contracted and almost cord-like for a distance of 2.5 inches. The artery was found to extend much higher into the neck than normal, and it was thought that, as it was compelled to take a sharp turn in the second part of its course, gradual blocking resulted which closed off the thyroid axis and caused the loss of collateral circulation. The second case, that of Hamann,² occurred in a woman, aged forty-five years, who for one year had complained of neuralgic pains in the right side of the neck and then extending down the arm to the hands and fingers. Ten months later it was noted that she had no radial pulse. This was shortly followed by gangrene of the tip of the index finger. The *x*-ray showed bilateral cervical rib, the longer one on the right side. There was atrophy of the forearm muscles and, in addition to the index finger, the ends of the middle and ring fingers looked as though gangrene was imminent. Operation was performed. An incision was made parallel with, and just above, the clavicle. The subclavian artery was found to be bent sharply over the rib and flattened. The rib was removed. The patient later became entirely well, and the pulse could be faintly felt in the brachial artery, but not below it. Waring's³ patient first noted pain and numbness in the fingers of the left hand. Slight gangrene then developed. No pulsation could be felt in the radial or ulnar arteries, but there was slight pulsation in the brachial. A hard, prominent swelling was felt above the clavicle, and the *x*-ray showed bilateral cervical ribs, the larger being on the left side. The left rib was removed by operation, and three months later the circulation was better, and all signs of gangrene had disappeared.

Todd⁴ also reports a similar case which had not quite progressed to gangrene: A man, aged twenty-seven years, had noted, for one year, a numbness and pallor of the right index finger, spreading to the thumb,

¹ Medical Record, 1907, lxxi, 253.

² Cleveland Medical Journal, 1910, ix, 453.

³ Clinical Journal, 1911, xxxvii, 369.

⁴ Lancet, August 10, 1912, p. 362.

middle finger, and ultimately to the hand. He had to keep the hand wrapped in order to prevent its becoming blue and cold. The walls of the brachial, radial, and ulnar arteries were so thickened that they felt like solid cords, and no pulse was palpable. The obliteration extended to within one inch of the axillary artery, and, on careful palpation, one could feel pulsation in the superior and inferior profunda vessels and also in a small artery in the situation of the anterior interosseus at the back of the wrist. The nerve symptoms consisted only of wasting of the flexor brevis and opponens of the little finger. X-ray showed bilateral cervical rib, free on the left side and articulating with the first rib on the right. An operation was performed, but no mention is made of the findings or after-results, except that there was no mechanical pressure on the vessels. Todd believes that any explanation of the vascular phenomena may be found inadequate if it depends only on direct mechanical pressure on the subclavian artery. He states that the flattening which is sometimes noticed in the subclavian artery at the summit of its curve is not due to constriction by muscles, but is an application of the law of hydrodynamics. Accordingly, he believes that the vascular symptoms may be trophic in character, and caused by a lesion of the sympathetic fibers in the lower part of the brachial plexus. It is among the fibers reaching the plexus by way of the first dorsal nerve that damage most frequently occurs. The site of injury is just behind the point where the eighth cervical and first dorsal nerves unite to form the lowest brachial trunk, and shortly after the first dorsal has received a small accession of fibers from the second dorsal nerve. Todd has previously found this communication to be sympathetic in constitution, the fibers forming part of the visceral supply of the upper limbs. The involvement of the sympathetic fibers of the vessels affords an explanation of the vascular symptoms, he believes, and thus explains the involvement of the peripheral portion first.

In addition to the above-mentioned symptoms, there is frequently a hard mass above the clavicle which, in at least one case, was mistaken for hypertrophied lymph nodes. In many cases, this mass was discovered during routine examination of the chest. The x-ray is the court of last resort. The older records refer to the frequent presence of scoliosis, and Goodhart states that it is almost invariably associated, but, in my records, its existence is only mentioned twice. I have referred to this in 1907, in discussing Murphy's paper. An interesting point in diagnosis is referred to by Waring: If you take the patient's limb and count the radial pulsation, you will find that it is of certain strength. Then lift the limb up so that the arm is raised above the head and count the pulsation again, and you will find it much stronger, a condition the opposite of the normal. The phenomena is caused by the removal of pressure from the subclavian artery.

¹ PROGRESSIVE MEDICINE, March, 1907, p. 83.

A curious case is reported by Hunt.¹ The patient was a girl, aged sixteen years, who recently had developed a hard lump in the left posterior triangle of the neck. Three weeks later she was seized with clonic spasm of the diaphragm, which lasted for two weeks and caused great weakness and loss of sleep. At operation a cervical rib was found, over which the brachial plexus was stretched. It was removed, the spasm of the diaphragm ceased, and two years later had not returned. He thinks that the rib caused the spasm by "exalting the normal impulse, regularly passing down the phrenic nerve and producing the usual respiratory contraction of the diaphragm by direct irritative pressure on that nerve trunk as to produce a violent spasmodic contraction of the muscles."

Treatment. There seems to be no unanimity of opinion as to treatment, and too frequently the view is expressed that operation should be performed *only* on the appearance of severe symptoms. I believe that if any nerve pressure at all is demonstrable, the indication is clear for surgical interference. The operation is not as difficult as is generally made out, and the mortality in the recorded cases is *nil*. The periosteum and rib should be removed entire to prevent regeneration, and great care should be exercised in handling the roots of the brachial plexus. I prefer a transverse incision about 1.5 inches above the clavicle, owing to the insignificant scar, although it is easier to work through a vertical incision posterior to the sternomastoid muscle. Streissler² recently described a new operation through a posterior incision close to the vertebra. In some respects this method of operation may lessen the chance of injury to the subclavian artery or to the brachial plexus, but the abundant muscular tissue which must be pierced makes the operation more difficult and more uncertain than the anterior operation. He claims that the method also lessens the possibility of injury to the pleura, but, in the reported cases, this accident seems rare, and, with ordinary care, should not often occur. In one of Henderson's cases, the pleura was accidentally opened, but no bad results happened.

GOITRE

Etiology. The cause of goitre is as yet unknown. Very little fruitful investigation was carried on during the past year in the study of this affection, and the preponderance of opinion as to the cause of simple goitre remains unchanged, viz., that some organic waterborne infection is most probable. At a meeting of the Vienna Gesellschaft der Aerzte, Graff³ stated that he was inclined to believe that steriliza-

¹ British Medical Journal, August 7, 1909, p. 314.

² Zentralbl. f. Chir., 1912, Band xxix, S. 283.

³ Lancet, January 13, 1912, p. 128.

tion of "goitriferous" water by ultraviolet rays was sufficient to make it incapable of producing the affection in question. McCarrison¹ has made extensive observations in the goitrous regions of India, and believes that suspended matters in the drinking water give rise to goitre, and can be removed by filtration. These observations should lead to an extensive investigation of the water supply in districts in which goitre is endemic, with a view to its complete eradication.

THE ETIOLOGY OF EXOPHTHALMIC GOITRE has not been solved, although some interesting facts have been brought forward during the year. Carlson² and his coworkers, after extensive investigations on animals, believe that the records of exophthalmos obtained by previous observers by thyroid feeding are based on errors of judgment, and that the nervousness and tachycardia similarly described are due to some other factors and not to the thyroid feedings. But we must remember that the nervous element is predominant in exophthalmic goitre, and that, consequently, in man with his more delicately balanced nervous organization, the expression of hyperthyroidism must differ from that of the lower animals. This has been brought out clearly by Klose³ and his coworkers in a splendid piece of experimental work in Frankfurt, performed on nervous fox terriers. They injected fresh thyroid extract prepared twenty to thirty minutes after operative removal from the patient, and were able to reproduce a pulse and temperature reaction lasting for some days, and closely resembling the postoperative pulse and temperature reaction seen in exophthalmic goitre. They believe that the toxicity, in these cases, is not due to excessive secretion, but to a masked and abnormal iodine combination. They were able to reproduce a somewhat similar reaction by the injection intravenously of large doses of potassium and sodium iodide. Unfortunately, Bardenheuer⁴ was unable to repeat the experiment with potassium and sodium iodide, but Klose, in a reply, stated that the use of nervous excitable, fox terriers is absolutely essential to the success of the experiment.

Marine⁵ discusses the *anatomical and physiological effects of iodine on the thyroid gland of exophthalmic goitre*, and states that he has continued his study and confirmed his previous observations. He is a persistent opponent of the thyroid hypothesis, and gives a summary of suggestive evidence to show that the thyroid does not play a primary role in the production of the symptom-complex of exophthalmic goitre. He states that the thyroid hyperplasia of exophthalmic goitre behaves toward iodine exactly as does any other thyroid hyperplasia of any animal thus far investigated. Hoover⁶ supports Marine, and states

¹ Proceedings of the Royal Society of London, B., 1911, lxxxiii, 335.

² American Journal of Physiology, 1912, xxx, 129.

³ Beit. z. klin. Chir., 1912, Band lxxvii, S. 601.

⁴ Archiv. f. klin. Chir., 1912, xcvii, 729.

⁵ Ohio State Medical Journal, 1912, viii, 353.

⁶ Ibid., 353.

that "when the thyroid gland of Basedow's disease varies from the normal type, the change is toward hypothyroidism rather than hyperthyroidism." Marine,¹ in another paper, discusses more in detail the literature concerning the iodine content and relation. This paper called forth a sharp criticism from C. H. Mayo in which he made the suggestion that Marine's observation led him to an opinion which is not supported by the surgeons of the present day. Plummer, in the same discussion, stated that the statistics of operation at the Mayo clinic showed: (1) That hyperplasia of the thyroid never exists without a production of thyroid secretion in excess of the demands of the individual; (2) that exophthalmic goitre is a clinical entity associated with a definite pathological process in the thyroid; (3) that if hyperplasia of the thyroid is of a sufficient degree or extends over a long enough period, exophthalmos is almost sure to develop; (4) that no matter how intense the intoxication from an adenomatous or colloid goitre not associated with hyperplasia, exophthalmos will not develop. Patients having simple goitre noticed the goitre at the average age of 22.8 years, the evidence of intoxication at 36.6 years, and came to operation at 39.6 years. Thus, a patient, aged twenty-three years, having an adenoma, has a definite fixed chance of developing thyrotoxicosis during her thirty-seventh year, and the symptoms may so closely resemble the clinical symptom-complex of Graves' disease that the two cannot be distinguished; he believes that this is one of the strongest arguments in favor of the disease being directly due to a disturbance in the function of the thyroid.

Without pursuing this subject farther, we at once see that there is apparently a great divergence of opinion between laboratory workers and surgeons as to the importance of the thyroid in causing or influencing the progress of the disease exophthalmic goitre. On the one side, we have a group of men believing that the hyperplasia of the thyroid gland represents a response to some toxic stimulant, and, on the other hand, a second group of men, mostly surgeons, who believe that the thyroid gland is primarily the source of the symptom-complex resulting from disturbance of its secretion, the particular cause of the disturbance of the secretion being unknown. This divergence of opinion will undoubtedly help to solve the problem, because the line between the two schools seems to be more sharply drawn this year than ever before. I feel that the clinician, in order to do his part in solving the problem, must publish more illuminating statistical information than has been done in the past. C. H. Mayo² states that, within the past year, they have operated on a consecutive series of 278 cases of exophthalmic goitre without a death. When we compare this marvellous result with the early mortality, say ten years ago, of fully 20 per cent., we must

¹ Journal of the American Medical Association, 1912, lix, 325.

² *Ibid.*, 26.

wonder at the improvements which have been made in surgical technique. When we also hear that the same clinic, as well as that of Kocher, obtained a cure in at least 75 per cent. of the cases, we feel a sense of satisfaction in the results of surgery. But what constitutes cure in the minds of different observers seems to vary within wide limits. Thus, Mayo refers to the restoration of usefulness and the resumption of former occupations, while Crile considers patients cured when they are able to withstand nervous shocks, such as fright, disappointment, worry, and grief in a normal manner.

It is this phase of the subject that requires to be made more uniform, so that the results of the different methods of treatment can be more accurately compared. Furthermore, the laboratory workers should compare metabolic studies made before operation and after the patient is considered cured by the surgeon, or by the *x*-ray specialist, or by the internist, etc.

Treatment. The literature upon exophthalmic goitre is very large, and I will simply abstract a few of the more important articles, discussing the state of affairs in this country, in England, and in Germany. In the paper mentioned above by C. H. Mayo, we have the views of the foremost operator on the thyroid gland in this country. He seems to avoid operating during periods of exacerbation or excessive activities of the disease, until the symptoms subside; also during gastric crises and acute delirium. He states that a dilatation of the heart which exceeds one inch is a serious condition, while that of 1.5 inches will give a percentage of unavoidable mortality. He makes the pertinent suggestion that if a patient under medical treatment relapses after a period of improvement, the treatment is renewed and, therefore, should there be a relapse after surgical treatment, because of too little gland removed or an increase of the remaining portion, it does not indicate a failure in the surgical principle, but calls for further operation. He treats "serious risks" by a single ligation of the vessels at the upper left pole, and, if the reaction be very severe, a second ligation of the right upper pole is made a week later. If the reaction be not severe, a partial thyroidectomy is done at the second operation. In other cases, a double ligation or thyroidectomy is performed at the first operation. In those cases which relapse after partial thyroidectomy with an increase in the size of the remaining lobes, the vessels at the superior pole should be ligated, or, if necessary, at a third operation a portion of the gland should be removed. Ether, preceded by atropin and morphin, is the anesthetic of choice for double ligation and thyroidectomy. In the severe type of cases, local anesthesia is used, and for extreme nervousness scopolamin is administered.

Fuller¹ sent a circular letter to the members of the Chicago Surgical Society, asking for information as to the extent of experience, methods

¹ Surgery, Gynecology, and Obstetrics, 1912, xv, 585.

and choices of treatment, percentage of cures, mortality, and end-results. The information received by Fuller seems to me to have been rather meager, and considerable difference of opinion seems to have been elicited regarding the definition of cure and as to the extent of surgery necessary in the several degrees or types of the disease. The majority of the reports stated that surgical treatment was indicated in (1) Goitre of undue size, producing, by its own weight, embarrassment to the act of respiration. In this class would fall cases with (*a*) irritating cough, produced by the goitre; (*b*) difficulty in swallowing, due to pressure of the goitre, and (*c*) deformity. (2) All cases of hyperactivity of the thyroid gland which are not at the same time suffering with acute exacerbations of the disease, and in which other less radical measures have shown their inefficiency. The immediate mortality in the 600 cases reported was estimated to be about 5 per cent., but as to the remote mortality, nothing tangible nor definite could be obtained.

The English and German authorities may be represented by abstracting the reports of a discussion which took place in the Royal Society of Medicine.¹ It was opened by a contribution from T. B. Dunhill, of Melbourne. He believes that the chief interest in this disease centres about the questions: Is surgical interference justifiable? If so, at what stage of the disease is it indicated, and to what extent is interference desirable? Then comes the question of the absolute or relative safety of patients, and what modifications of technique help to assure this? Finally, the most important of all, in what condition do we leave the patient?

He divides exophthalmic goitre into four classes: (1) The classical type, in which there is present goitre, tachycardia, palpitation, tremor, and staring eyes, with or without exophthalmos. There may be other less constant symptoms, such as amenorrhea, emaciation, alopecia, etc. The heart has not "broken down," and the question of operation or of medical treatment is open to argument. The patient may be returned to complete health by medical treatment and rest, or with no treatment at all, or, on the other hand, may progress and end either in death or in such organic degeneration that return to health is an impossibility. In such cases, one must take into account the position in life of the patient, and the severity of the case in relation to the progress made under medical treatment. In cases of this class, where organic disease was not present, operation afforded a complete cure, provided sufficient gland was removed, done under local anesthesia, and by an expert operator. He refuses to operate, however, unless the patient has had three months of efficient medical treatment, unless there are present other circumstances involving the case. (2) In the second class, he places those cases in which the disease has progressed

¹ British Medical Journal, February 17, 1912, p. 366.

to the point of organic degeneration. There may be extreme emaciation, edema, irregular pulse, displaced apex beat, etc.; this constitutes a class which most men who operate for goitre will not touch for two reasons; first, because operation is too dangerous, and, second, because organic disease has so far advanced that improvement cannot follow; but out of 380 thyroid operations, Dunhill has operated on 19 in this class, and does not think that operation is particularly dangerous or that improvement is impossible. He does not operate, however, during an acute exacerbation of the poisoning, or when bronchitis is present. (3) In the third class he places those cases in which the thyroid gland is quite small, and yet there may be an extreme degree of one or more of the characteristic signs. In this class he thinks it is unwise to remove portions of a gland which is not obviously enlarged, even though all, or most, of the other characteristic signs are present. One must be sure that there is no enlarged portion beneath the sternum or clavicle, but this is not always easy to detect. Microscopically, such glands show acini densely packed with active cells. Such cells are likely to atrophy later from mutual pressure. (4) This class includes the cases in which there are some thyrotoxic symptoms associated with a goitre which is not truly exophthalmic in type. He does not mean those cases of simple colloid goitre which have been in existence for some years, and are then followed by exophthalmic symptoms, the so-called secondary exophthalmic goitre. There are some cases of adenoma which, apart from any question of position, seem to irritate the surrounding glands or tissue and cause some tremor, some staring of the eyes, and make the heart more easily excited. This class requires no further discussion, as the response to operation is immediate and complete.

As to the *mortality*, Dunhill has operated on 380 cases of all classes, including 230 cases of exophthalmic goitre, with 4 deaths, all of which were evidently cases of Graves' disease, a mortality of 1.7 per cent. He believes that certain modifications in the technique have had some importance in producing this low mortality. He operates under local anesthesia because the patients are safe, the distress is negligible, and the recurrent laryngeal nerve may be guarded, postoperative vomiting does not occur, and pints of fluid may be given by the mouth. He uses about 7 ounces of a 2 to 1000 solution of novocain, well infiltrating all the front of the neck. He also believes that the removal of one lobe and a half is possibly less dangerous than the removal of one lobe alone, because the removal of one lobe causes reflex dilatation of the vessels of the other lobe, with increased activity of the gland, which, by reason of its envelopment by its capsule, must pour the secretion into the lymph and vascular systems. If one lobe and a half be removed *without crushing*, the clean-cut surface of the other lobe allows free escape of the thyroid secretion and lymph which is led to the exterior by an

efficient drainage-tube. Furthermore, the removal of one lobe may leave too much diseased thyroid tissue behind. He does not fear the possibility of myxedema, and has never seen any evidence of tetany, although he does not do the intracapsular ligation of the vessels.

Sir Victor Horsley¹ stated that he had discontinued doing ligation of the arteries as it did not produce the effects brought about by the removal of the lateral lobe and part of the isthmus. He did not believe that there was any medical treatment which would cure a case of parenchymatous goitre with exophthalmic symptoms in the adult. He is convinced that a certain number of cases of true exophthalmos would get well with faradism and the rest-cure treatment, but, if after three months' medical treatment, the patient was not on the road to complete cure, surgery should be resorted to, namely, removal of the lateral lobe and isthmus. He always uses general anesthesia, and is convinced that the question of the anesthetic has no influence on the prognosis of operation, but believes that too often an excess of the anesthetic is given.

Hale White² traced a number of patients suffering with exophthalmic goitre and not operated on, and found that, by comparing these patients with the "expected deaths" among women of the ages implicated, the mortality of exophthalmic goitre was about twice that of people in general. He thought that the ultimate test must be actuarial. One must know what the expectancy of life is in a person with a part of the thyroid removed, and whether operation would get the patient well quicker and more perfectly than medical treatment.

Albert Kocher³ reported that, in the Berne clinic, there had been 865 operations for Graves' disease performed on 669 patients. He reiterates the teaching made familiar by his father, that the thyroid is primarily the cause of the disease, the changes consisting in the more rapid and more abundant absorption of the material stored in the gland follicles. The epithelium becomes hyperplastic and the gland overvascularized; if the disease is progressive, all the stored-up material is sooner or later absorbed, according to its quantity and the rapidity of progress; under further progression, there is no more storing of material in the gland follicles, but the proliferation of the epithelium is still progressive all through the gland, and degenerative changes of the epithelium can take place, together with formation and proliferation of lymphatic tissue. As to the exciting causes, he discusses neurogenic causes and toxic causes, the latter being of chemical or infectious nature.

He divides the disease into three types: (1) Those with symptoms of hyperthyroidism presenting only occasionally pronounced hyperthyreosis which is not progressive; it is due to the sudden or very rapid

¹ British Medical Journal, February 17, 1912, p. 503.

² *Ibid.*, p. 504.

³ *Ibid.*, p. 576.

and abundant absorption of the thyroid secretion (thyroid diarrhea), but, when the cause of the outbreak is past, the gland undergoes no further change. They had 130 cases of this type, mostly combined with nodular goitre of nearly every size, and all were entirely cured of their symptoms with the exception of 2 who died of postoperative pneumonia. (2) Cases of steadily progressive and (3) of periodically progressive Graves' disease. There were 539 cases, and, of these, they have so far collected the results of 360 operated on; 160 (45 per cent.) are radically cured; 149 (41 per cent.) show at the present moment, months or years after operation, a few symptoms of the disease, but have been greatly benefited by the operation, and can earn their living without any difficulty. Among them there is a considerable number in which a more extensive operation would give complete recovery, but the patients are satisfied and are unwilling to submit to further treatment. In a small number of cases, the only symptom still persisting is the exophthalmos, and another group show symptoms the result of organic diseases, such as chronic myocarditis, chronic nephritis, diabetes, etc., and some patients still show symptoms of functional trouble of the thyroid gland. In 28 patients (8 per cent.) the ultimate result cannot be called satisfactory, partly because of incomplete operations, the patient refusing further treatment, and partly from recurrence of the disease. Twenty-two patients (6 per cent.) have died since from other diseases, in only a few of which does the former Graves' disease seem to be connected with the ultimate death.

The answer to the question *which cases are suitable for operation*, seems easily answered, according to Kocher. He believes that if all cases were operated on within a short time after the outbreak of the disease, they would probably all be cured by the operation. A constantly irregular pulse, a lasting notable amount of albuminuria, very frequent fatty stools, distinct and constant glycosuria, low blood pressure, marked status lymphaticus (especially the type without the characteristic lymphocytosis of the blood), a very high lymphocytosis of the blood, combined with very marked leukopenia, very slow coagulation of the blood—all *forbid* operation unless they can be brought to disappear under proper treatment during the time of preparation for operation.

Kocher offers nothing new in the discussion of his *operative technique* except to emphasize the necessity of not doing too much at one time, and he insists on the use of local anesthesia. He uses injections of 0.5 per cent. and 1 per cent. novocain solution, with 2 drops of 1 per cent. adrenalin solution for 10 grams of novocain. The statistics show 2.6 per cent. mortality from 865 operations. Of the fatal cases, 5 were lost from pneumonia, 3 from nephritis, 2 from embolism, 4 from status lymphaticus.

In many of the contributions from Kocher's clinic, stress is laid on the importance of the *lymphocyte count*. Wilson¹ has not been able to confirm this finding in the Mayo clinic. They have made differential counts on 800 cases of both exophthalmic and simple goitre. They have analyzed all the 27 deaths which have occurred in exophthalmic goitre. Not one gave a high lymphocyte count. Of the 25 in which a high lymphocyte count was given, not one has been a severe case. It was true that in exophthalmic goitre there were a great many cases with a relatively high lymphocytosis, up to 40 per cent., but it was equally true that in simple goitre they have equally high lymphocytosis.

X-RAY TREATMENT OF EXOPHTHALMIC GOITRE. A number of papers are published each year by the advocates of this method of treatment but they never impress me as being sufficiently satisfactory to warrant serious attention. The best exposition of this method of treatment that I have seen is the paper by Stoney,² who reports 41 patients treated by the *x-ray*, with 14 complete cures, 22 cases so greatly improved as to be able to live an ordinary life, 4 somewhat improved, and 1 not improved. She tabulates these cases, and shows the influence of the treatment upon the pulse, exophthalmos, goitre, and tremor. The acute cases are exposed to the rays twice a week for a month, stopped a fortnight, and then started again. Chronic cases are treated once a week. The patients are placed on a couch, and each lobe of the thyroid exposed alternately to a vacuum tube. The exposure lasts seven to ten minutes, the anode being six inches from the skin, which is protected with six layers of blanket. The treatment must not be hurried, and, in severe cases, it takes from six to eight months to obtain a satisfactory result. Stoney emphasizes the necessity for removing all cause of worry, and overwork, the providing of sufficient food, and the attention to teeth, tonsils, and adenoids. In addition, the patient should rest as much as possible. Hooten³ has also reported some encouraging results in the use of the *x-ray* in this condition. He treated 31 patients, 14 private cases, and 17 hospital cases. Of the 14 private cases, 10 were apparently cured, and the remaining 4 showed very marked improvement and relief of symptoms, and were enabled to return to practically all of the activities of normal life, except vigorous exercise, and running up and down stairs, etc. Of the 17 hospital cases, 7 were classified as cured; 4 were markedly relieved; 4 showed very little improvement, and the other 2 were not treated a sufficient length of time. Altogether, therefore, the cured and partly relieved numbered over 80 per cent. He believes that the rays depress and diminish to within normal limits the secreting power of the thyroid gland, and that they lessen, often with great rapidity, the nervousness, dyspnea,

¹ New York Medical Journal, 1912, xevi, 1352.

² British Medical Journal, August 31, 1912, p. 476.

³ Ibid., June 8, 1912, p. 1289.

tachycardia, and tremor. They cause an increase in the patient's weight, and, as a result, there is a return in a greater or less degree to normal enjoyment of life.

THE BREAST

Paget's Disease of the Breast. Since Sir James Paget, in 1874, drew attention to the relation between a form of eczema and carcinoma, considerable speculation and controversy have arisen in the literature as to the true nature of the disease. McKenty¹ reports that out of 400 breasts removed for cancer in the Royal Victoria Hospital, Montreal, there were but 2 cases of Paget's disease. He reports these cases, and discusses the literature. The various theories that have been advanced in explanation of the etiology may be grouped under three headings:

1. The theory that it is not a cancer in itself, but a precancerous eczema of the breast, which, after a long interval of time, may give rise to the malignant lesion. A precancerous eczema, similar to Paget's disease, has been described as occurring in the clitoris, around the anus, over the pubes, etc. The theory seems untenable in view of the anatomical continuity between the two lesions.

2. The parasitic theory. Several observers have claimed to have found coccidia in the tissues removed, but the theory has not been generally confirmed, and cannot be accepted.

3. The irritation theory. Chronic irritation is well known as a potent influence in exciting the appearance of carcinoma. Smokers' lip, soot cancer, paraffin cancer, etc., are well known examples of epithelial proliferation caused by chemical irritation. There is no evidence that Paget's disease is due to irritation from without, and, accordingly, McKenty believes that it is reasonable to suppose that an abnormal secretion by the mammary acini themselves might set up epithelial proliferation. His theory is supported by the fact that these tumors arise in an organ which is in a state of regression, and that the eczematoid condition is histologically analogous to the inflammatory infiltration which is seen in carcinomas elsewhere. In the absence of any proof that there is or is not an irritant secretion, theory will do as well as any other, although I should think that the discharge from the nipple should have been present for some time if such a theory is to be considered tenable. In the cases reported, the secretion occurred about the same time as the beginning of the eczematous state.

4. The melanoblastoma theory. He quotes from Kreibich,² who believes that the infiltrating cells are anaplastic melanoblasts, which

¹ Surgery, Gynecology, and Obstetrics, 1912, xv, 457.

² Berlin. klin. Woch., December 4, 1911.

have lost the power of forming pigment. McKenty, however, does not believe that Paget's disease is such a melanotic tumor, unless we are to describe every non-pigmented tumor cell as a melanoblast which has lost the power of forming pigment.

Histologically, a study of the reported cases revealed a proliferation of the stratum Malpighii, a plasma-cell infiltration of the corium, and a plugging of the milk ducts due to the proliferation of the lining epithelium.

Clinically, the patient is usually a parous woman, aged over forty years, in whom an eczema began in or around the nipple, bright red in color, sometimes dry and scaly, but more often moist and possessing a sharply defined, elevated, serpiginous border. It resists all treatment, and subsequently the nipple retracts and a deep cancer develops. The points which differentiate the condition from other eczemas, such as occur in pregnancy, lactation, and scabies, are the more acute course, the swelling of the nipple, and the absence of a well-defined margin. The age of the patient also helps to distinguish between the two conditions. McKenty advises operative excision, with complete removal of the breast, as the only rational and certain means of cure.

Tumors of the Male Breast. The various types of tumor encountered in the female breast find their prototype in the rudimentary gland of the male. In the various statistics published in the literature, we find that carcinoma is the most important tumor, but that sarcoma and benign growths are also frequently observed. Naturally, owing to the smaller size of the gland, both diagnosis and treatment are more certain than in the female, and a study of the literature reveals certain differences in the clinical manifestations. These have been pointed out by Speese,¹ who reports several cases and studies the literature. He finds that carcinoma occurs considerably later in life in the breast of the male, the average age being about fifty-five years, although, as in all tumors, it has been reported at an early age, twelve, twenty, and twenty-two years respectively. The oldest case on record occurred in a man, aged ninety-one years. A definite history of injury to the breast is obtained in a sufficiently large number of cases to attach some importance to this factor as a predisposing cause in the development of cancer. Direct trauma does not seem to be so important as the effect of chronic irritation. A number of cases were reported in workmen who were accustomed in their occupations to exert pressure against the chest. Constant injury is not only believed to be an etiological factor of importance, but it also predisposes to ulceration in those cases in which the carcinoma has already developed. The only other point of etiological interest is the long duration of time between the first observation of the tumor by the patient and the time when he comes under treatment. In a few cases the growth has been extremely

¹ *Annals of Surgery*, 1912, lv, 530.

rapid, but the average has been 29.5 months according to one author, and from eighteen to twenty-five months according to another. In females this period is much less, varying from ten to twelve months.

THE CLINICAL PICTURE OF THE DISEASE. It does not differ markedly from that seen in the female, the growth being small, hard, and freely movable in most instances, and only occasionally producing pain. Nipple retraction is common, owing to the close proximity of the growth to the duct and the tumor shortly becomes fixed to the surrounding parts and often is infiltrating in character. The operative mortality at the present time is *nil*, as shown by the 34 cases collected by Warfield in 1901, and in 30 reviewed by Speese. As to the ultimate cure, nothing definite is known; if recurrence does occur, it is usually found in or near the scar of the operation, or in the axilla of the opposite breast. Histological examination will reveal that most of the tumors arise from the ducts of the gland, as is to be expected in the lack of development of the acini. A number of melanotic and squamous carcinomas have been reported.

Sarcoma of the male breast is a very rare condition, and Speese reports that there are no statistics since Connell, in 1907, collected 34 cases. Most of the cases were of the spindle- or round-cell variety, and were rapid in growth, of rather large size, and, in proportion to the size of the tumor, were much more movable than carcinomas. This disease occurs at a somewhat earlier period than carcinoma, but is liable to be confused with it, owing to the fact that adults are usually affected, that the lymphatics are involved and that, in some cases, the growth is slow and fixation of the tumor occurs. Of course, the differential diagnosis is not particularly important, because early radical removal of all tumors is indicated.

Finally, Speese discusses the *benign tumors* of the male breast, but does not bring them clearly into relationship with the similar tumors seen in the female. He prefers the clinical classification of Woodyatt, who divides them into two groups: (1) A sharply circumscribed form which have all the characteristics of fibro-epithelial tumors occurring in the breast of young females; (2) a diffuse, ill-defined growth which may occur at any age as the result of traumatism, and having the same structure as that seen in the first group, although signs of inflammation are more evident. Speese also reports that cystadenomas also occur in the male breast and that both of these tumors are liable to malignant degeneration, particularly if trauma occurs.

Cancer of the Breast. There seems to be a tendency, if one may judge from the literature, to certain refinements in the treatment of breast tumors whereby disfiguring operations may be avoided if the tumor is benign. Warren's plastic resection of the breast for abnormal involution was devised for this purpose, and the papers of Bloodgood, in which he explains the absolutely benign character of certain cysts in

the breast may also be quoted in this connection. More recently, Thorne¹ discusses this subject, and his remarks can be grouped under two headings. The first of these, namely, that malignant tumors may exceptionally disappear by a process of spontaneous healing is too dangerous to be considered by the practical surgeon. The fact is true, but it is only the occasional exception. The other question is as to the method. "Should transitional, borderline or presently-to-be-malignant neoplasms be treated by the radical method?" Thorne does not clearly indicate what is his answer to this question, but I judge he thinks they should not be so operated. My own experience would lead me to unhesitatingly advise a radical operation in these cases. I am entirely in accord with the opinion expressed by the late Dr. Richardson,² "but as clearly as I can express my opinion by words whose significance we all understand, it is this: We should remove, breast and all, those tumors in the diagnosis of which there is enough uncertainty to call that uncertainty a reasonable doubt. We should remove from the breast or explore those tumors in the benignancy of which we have enough indecision to call that indecision a reasonable doubt. We should leave untouched only those growths in which we are so positive that we would let them go in the case of our nearest and dearest." It is curious how one may quote from an authority in support almost of any contention that we wish to make. Thorne quotes from Handley to support his statement about the frequency of retrogression of cancer of the breast. I might also quote from Handley,³ who, in a recent paper, states that whenever a tumor or swelling definitely palpable with the flat hand appears for the first time in a woman over forty, the spectre of cancer arises, no matter how innocent the characters of the tumor appear to be.

Of course, no one but surgical amateurs would remove the entire breast for the periductal fibroma of early life, for retention cysts, etc. I prefer the radical operation for abnormal involution of the breast, and for papillary cystadenoma, although in apparently non-malignant cases I have usually not dissected out the axilla. The promiscuous use of the plastic resection in abnormal involution has been followed by unfortunate recurrences in cases which histologically presented little or no evidence of malignancy. The difficulties in diagnosis of tumors of the breast is considered by Barrie,⁴ who states that the earlier the tumor is seen, the more difficult it is to make a positive diagnosis. If, owing to the early stage of the growth or unusual features in the history and examination, the clinical picture does not clarify the situation, the nature of the lesion may be determined by section

¹ *Journal of the American Medical Association*, 1912, lviii, p. 459.

² *Ibid.*, 1911, lvi, p. 315.

³ *Medical Press and Circular*, 1912, xciv, p. 324.

⁴ *New York Medical Journal*, 1912, lxxxv, p. 739.

of the tumor mass and its appearance in the gross. Tumors of the breast, clinically benign, sometimes show a gross pathological picture of malignancy; occasionally a clinically doubtful tumor will show a gross pathologically benign lesion, but much more often a malignant one. It is therefore essential to combine the clinical with the pathological picture to arrive at positive and reliable conclusions. The clinical picture having been obtained, one should study the pathological appearance of the tissues removed. Failure to obtain the clinical facts, and the lack of ability to recognize what the gross specimen shows, will lead to wrong conclusions if reliance is placed on the picture obtained from the microscopic section. In previous reviews I have emphasized the importance of the gross appearance of breast tumors. The recognition of these clinically doubtful cases by inspection of the tissue enables the surgeon to spare the patient a radical operation when the tumor is benign, or indicates when it is malignant that amputation should be carried out at once, thus avoiding the necessity of a secondary operation.

Handley¹ discusses three forms of breast cancer in which some or all of the text-book symptoms, such as adhesions, retraction, and elevation of the nipple and enlargement of the axillary glands may be absent.

EARLY CANCERS. It may be possible to feel a cancer in such an early stage that the characteristic signs are absent. The presence of a small, hard swelling, more or less rounded in shape and fixed in the substance of the breast, may be the only physical sign. Careful manipulation may fail to show adhesion to skin or fascia, pain may be conspicuously absent, the lump may be single, and neither elastic nor fluctuating. Uncertainty of such cases can be resolved only by exploratory operation. But the exploratory operation should be a restricted one, made through a small incision. If an extensive operation is done and a presumably innocent tumor removed which subsequently is shown to be malignant, the difficulties in the way of subsequent operation may prove to be insuperable.

MOBILE CANCER. Certain cancers, instead of infiltrating, increase in diameter mainly by a process of centric growth, pushing aside the surrounding normal tissues. Between the cancer and the tissues a special layer of stroma develops, which forms in the tumor a capsule almost as definite as that of a fibro-adenoma. Clinically, such tumors may be absolutely indistinguishable from fibro-adenoma, and even at operation the tumor may shell out of its bed without much difficulty. In such cases, microscopic examination is the only safeguard against a ghastly mistake, because a tumor supposed to be a fibro-adenoma beginning after the age of forty years is more likely than not to be a cancer.

¹ Medical Press and Circular, 1912, xciv, p. 324.

PERIPHERAL CANCER. A cancer may commence in an outlying lobule quite separate from the main body of the breast. In such cases there is rarely much difficulty in diagnosis, for the tumor is close to the skin and fascia, so that dimpling, adhesion to the skin, and fixation to the fascia soon become manifest. The clinician should not be misled by the small size of these peripheral tumors, for the prognosis is more grave than if the tumor were centrally situated. Infiltration of the chest wall and the pleura occur at an earlier date because the peripheral cancer is separated from the chest wall only by a relatively thin layer of muscle. An important fact in the radical operation and one frequently overlooked, is to plan the incision so that the primary growth is at the centre of the area of tissue excised. In the past it has been usual to deal with peripheral growths by almost the same technique as that employed for tumors situated beneath the nipple. The line of section, too, is close to the growth, and under such circumstances recurrence is very likely.

METASTASIS. There is some difference of opinion concerning the route by which cancer cells reach the distant organs. Handley's well-known theory of permeation explains the superficial metastasis, although he also believes that blood infection is unusual, even of distant parts, such as the bones. His arguments are very interesting, and will be found in the cancer reports of the Middlesex Hospital. Most authors believe that remote metastasis is caused by the entrance of the cancer cells into the general circulation. Beatson¹ has reported an interesting case bearing on the rationale of the exact *modus operandi* of lymphatic spread in cancer. He believes that the spread of cancer cells is not by gentle permeation (Handley) but is a pressure dissemination, comparable to the condition of affairs that exists in the opening up of the collateral circulation when a main artery is obstructed or tied. The case which he reports had secondary deposits at the umbilicus, vulva, anus, Scarpa's triangle, lower jaw, and scalp. The connection between the lymphatic vessels in these regions is shown by diagrams, so that there is no difficulty in understanding the transference of cancer cells from one area to another, provided there is intercommunication between them, and that there exists a sufficient *vis a tergo* to drive on the cells. Such a driving force is furnished by the proliferating power of the cancer cells, which lead to their accumulation in such numbers that room must be found for them, and, to allow of this, they are forced onward from the seat of the primary growth. He also calls attention to an important practical point, viz., that the finding of a superficial nodule should lead to a careful examination to determine whether one is dealing with a primary growth or simply a distant nodule the result of widespread lymphatic pressure dissemination.

¹ Glasgow Medical Journal, 1911, lxxvi, p. 431.

Judd,¹ in discussing the experience of the Mayo clinic, states that on several occasions they have observed cases in which there was no evident lymphatic involvement, and yet a well-advanced metastatic growth was present in one or more of the bones. In advanced cases of carcinoma of the breast, he recommends the taking of x-ray pictures of the bones most frequently invaded (sternum, ribs, femur, vertebra, and humerus), since it is useless to remove the breast should one of the bones be involved.

RESULTS. The experience of the Mayo clinic is detailed by Judd in his paper. Of 708 cases in which a radical amputation was performed there were but 3 deaths; one was from pulmonary embolism on the sixteenth day, and two were from late infections, one in the third and one in the fourth week. The average age of the patients was fifty-five years and six months, and there were 46 between twenty and thirty-five years of age. Of the cases in which a period of over two years has elapsed since operation 44 per cent. were alive and well; of those in which a period of ten years had elapsed, 23.5 per cent. were alive and well. Steinthal² reports 200 cases which had been under constant observation since 1905. Of these there were 61 (39.65 per cent.) which were free from recurrence, and 121 who suffered from recurrence. Seven patients died from the operation, and 11 others died from some intercurrent disease. Steinthal reports his cases in tabular form, and his figures and those of Judd emphasize the fact that the three-year limit is entirely too short to determine the probability of cure.

¹ New York Medical Journal, 1912, xcv, p. 867.

² Beiträge z. klin. Chir., 1912, lxxvii, p. 569.

INFECTIOUS DISEASES, INCLUDING ACUTE RHEUMATISM, CROUPOUS PNEUMONIA, AND INFLUENZA

BY JOHN RUHRÄH, M.D.

DURING the year of 1912 interest in the infectious diseases was unabated, as is evidenced by the large number of contributions in the medical journals. Never before in the history of medicine has the same amount of thought been given to this subject, and perhaps never before has the same amount of painstaking, conscientious work been done in attempting to solve the many problems that present themselves in connection with the transmissible diseases.

Some of the reports deal with the practical methods of preventing disease, some with the scientific studies of rather abstruse problems, as those of immunity, and some with the study of the parasites which cause disease. Many of these articles are worthy of very serious attention, while others are of an extremely questionable nature.

The Tenth Annual Report of the Census Bureau, which presents the census of 1909, has just been published, and, in connection with the infectious diseases, there are several interesting things to note. In 1900, there were 166.2 deaths due to infectious diseases per 100,000 inhabitants. This has fallen steadily since that time, and it is pleasing to note that in 1909 the number of deaths from this cause was only 59.1 per cent. of the number in 1900. Among the more important infections, decreases were noted in measles, whooping cough, diphtheria, dysentery, and tuberculosis. Typhoid decreased remarkably, and it is especially important to note that the decrease has been larger in the country districts than in the cities. Scarlet fever showed an increase in the number of deaths, as did also bronchopneumonia. There were also increases in cancer, in diseases of the circulatory system, and particularly in arterial diseases. There was also an increase in the number of deaths from violence.

In cities, there are more deaths due to tuberculosis, pneumonia, and diarrhea than in the country districts. The reports are not yet as complete as one would wish, as there are many large areas in the United States not yet within the registration district. It is to be hoped that the authorities of the States will recognize the very great importance of mapping out, with exactness, what is going on in regard to infectious diseases, and also to other causes of disease and death.

It would seem to me that we now have at our disposal a sufficient amount of accurate data to enable the health authorities to take up a more systematic campaign against the infectious diseases. In order to make this efficient, it will be necessary to change somewhat the health officers, as it is a notorious fact, that in almost every part of the United States, physicians in practice are appointed to fill important places in the Health Department, and anyone who has ever practised medicine knows how impossible it is to do thorough, conscientious work in one's private practice and at the same time to attend to the routine of some other outside work. It would seem to me that until each county has a health officer thoroughly trained in sanitation and public health, there can be very little systematic, correlated work done. This is now attracting attention and some States are already considering this problem. It is a lamentable fact that there is little or no training in the United States for sanitary officers. It is a special branch of medicine, requires special aptitudes and study, and there should be schools which give certificates or diplomas of doctor of public health. The positions of health officers should be filled only with the holders of such certificates, beginning just as soon as the need can be supplied. These county health officers should be placed beyond the reach of politicians and the need of earning their livelihood in any other way than by the conscientious fulfilment of their duties. It is a well-known fact that a too energetic health officer is generally removed from office because, in his effort to abate nuisances and to decrease disease, he incurs the enmity of some influential citizen. In addition to trained health officers, there should be the means of correlating the work done by a larger and more active national department of health. Special outbreaks of epidemic diseases could be handled much more promptly by government experts, and there should be no need for any individual State or county to maintain a sufficient corps of trained diagnosticians, laboratory men, and field workers as might be needed to cope with some accidental outbreak of disease as the experts of the national government could be called in to wage a special war until the danger was over. With the matter of public health, the old feeling of States could certainly be made to yield sufficiently to permit of rational treatment and control of the infectious diseases.

The pollution of water-ways and the large bodies of interstate water is becoming a very important problem which is attracting attention, and which must in the near future be taken up in an energetic manner if we would preserve to our people anything like pure, safe water. Considering the situation of the various rivers and lakes, this problem must be an interstate one, and could be best dealt with from a central office with the coöperation of the health authorities of the States directly involved.

Mills and Reineke have called attention to the fact that when the

death rate for one infectious disease is lowered, there is always a lowering in the death rate from other diseases. This is largely because when one disease is prevented at the same time others are prevented, and we now know certain large sources of disease which it would seem wise to take up in some concerted manner. The outlook for doing this is very hopeful when we consider what has been done in Havana with yellow fever, in the Canal Zone with yellow fever and malaria, and what is being done in the South in regard to the hookworm disease. Eradication, or, at any rate, the reduction in the number of cases of infectious diseases, will depend largely upon getting pure water, pure milk, the suppression of unnecessary dust, and stopping soil pollution by an efficient means of sewage disposal.

In addition to this, the question of human carriers of disease must be more thoroughly studied and a campaign carried out with a view to the reduction of the insects and the smaller animals known to be carriers of diseases affecting human beings. The mosquito, the flea, the louse, the fly, the bed-bug, and rats and mice, not to mention others, should be systematically exterminated. At the present there is, perhaps, no more chance for the total extermination of these pests than there is of keeping weeds out of a lawn, and yet if a systematic effort is made we know that a lawn may be kept reasonably free from weeds, and if no care is taken we also know how quickly they make their appearance, and how rapidly they spread. If it were a single piece of work which would not have to be repeated, there is probably no question about it being undertaken. The fact that the work has to be carried on day in and day out leads some communities to neglect their duty entirely, until some trouble or epidemic forces them into hysterical activity.

There have been a large number of interesting observations made during the last year, and it is difficult to say just what is the most important and what is the most interesting. The work of the Rockefeller Hookworm Commission is perhaps one of the most striking things and the revelation of the sanitary condition of most of the rural districts in the South is rather appalling, just as the enthusiasm shown for the work is reassuring. The work of the suppression of the hookworm will undoubtedly do a great deal to lessen the amount of typhoid fever and dysentery, as it is to be hoped that soil pollution will sooner or later be brought to an end.

The *researches in poliomyelitis* have continued, and perhaps the most important contribution is that of Rosenau who has demonstrated that it is possible for the stable-fly to transmit the disease. Whether this is the common mode of transmission of the disease, and whether it is the only one will have to be determined by further study.

The *researches on typhus fever* are of particular interest, and it has been proved that the disease described by Brill is really a mild sporadic

typhus fever, and it is quite probable that we have had the disease in our midst without knowing it.

The subject of *cerebrospinal fever* has also continued to be one of interest, and improved technique in administering serum is one of the new contributions, while the suggestion of a method of producing an immunity by the injection of dead meningococci is a subject which will in the future attract much attention. The possibility of the practical use of *dry diphtheria antitoxin* which may be kept for long periods of time is also worthy of particular notice, as it enables the physician to carry with him and have constantly on hand a reliable antitoxin for immediate use. The use of *emetine hypodermically in the treatment of dysentery* and other affections due to amebas has also shown the most remarkable results, and, if the observations already made are borne out by others, this method of treating amebic dysentery will soon supplant the methods we have ordinarily used. Another remarkable feature of the last year is the number of epidemics of what the English call *septic sore throat*, which is due largely, not entirely, to an infected milk supply. Such epidemics are noted in Boston, Baltimore, and Chicago, and elsewhere, and this disease will repay careful study as it is only by recognition of it and its cause that a great amount of suffering and death can be prevented.

Sanitary Leagues and Infectious Diseases. The citizens of Norfolk, Virginia, have formed a league for improving the sanitary condition of the city and suburbs, and this Norfolk plan is one which might be followed by other cities to great advantage. The chief object is to have a clean city, and one that is as attractive as possible, and the members have pledged themselves to carry out this ideal as far as possible. They also lay considerable stress on the details of sanitary work and the beautifying of the city, and there can be no question that such a movement will have a marked effect upon improving the health of the city, and particularly in lessening infectious diseases. The effect of attractive surroundings upon the general carrying out of any scheme of betterment is well known, and the results in Norfolk will be watched with considerable interest.¹

A New Febrile Disease. There have been a number of different febrile diseases described from time to time, particularly in tropical climates, and these have often been called by popular names, such as seven-day fever, and numerous other similar descriptive terms. Some of these diseases have turned out to be mild typhoid, some paratyphoid, some influenza, some pneumococcus infections, but from time to time diseases are described which do not seem to belong to any of these, and which appear to be some definite clinical entity.

Deeks² has described an epidemic occurring in Ancon, in the Canal

¹ Public Health Reports, May 3, 1912, p. 641.

² Journal of the American Medical Association, October 26, 1912, p. 1511.

Zone, and has used the unfortunate term of "a hitherto unrecognized six-day fever." There is a definite objection for using such terms, as it is liable to lead to the confusion of diseases which have nothing uncommon, except the length of time which the fever usually lasts. For example, relapsing fever is frequently called seven-day fever, and dengue and pappataci might easily, and in some phases do, bear similar names. Deeks believes that it is quite probable that this disease was introduced into Ancon through the mail. It seems to us that one should be exceedingly sure of fomites carrying a disease before using that as an explanation in place of some human or animal carrier.

The disease has a sudden onset without any characteristic prodromata, and the constitutional symptoms which are common to all febrile diseases. Headache is common and said to be particularly about the eyeballs. There is no coryza, sore throat, nor cough, and no bowel disturbance, and there are no muscular pains, but vague aches in the back and legs. The onset is always sudden, with chills or chilly sensations, and, after the chill, the temperature rises from 101° to 104° F. The fever continues for about six days with slight morning remissions, and has a more or less abrupt termination. After the temperature falls, it generally remains normal, but in 2 severe cases there was a slight secondary fever causing a rise of from 1° to 2° lasting three days. Curiously enough, there was no disturbance of pulse or respiration, both remaining practically normal. The spleen was constantly enlarged, extending sometimes 2 or 3 inches below the costal margin. There was little or no enlargement of the liver. The blood count remains practically normal, although one patient showed eosinophilia, but he was also suffering from a slight colitis with ciliated monads. There were slight traces of albumin in all cases, and a few granular and hyaline casts. Two of the cases developed a very severe albuminuria which disappeared a week or two after the cessation of the fever. There was anorexia during the febrile period, and considerable after-depression. The incubation period is apparently ten days, and it would seem that, while the disease is highly infectious, the infectious period probably precedes the onset of the fever, as there were no cases in the hospital caused by contact, and no precautions were taken to avoid contact. Blood cultures, and cultures from the stools and urine, were all negative, as was the Widal reaction. Most of the patients had more or less of a miliaria eruption, and Deeks was inclined to believe that, in most cases, there was a general erythematous rash soon after the onset. Some of the patients developed a scarlatinal form of eruption which was sometimes of a petechial character, but, in these cases, quinine had been given, which may have accounted for it. There was a somewhat similar eruption in 3 cases after the temperature became normal. The disease was not dengue, and it was not malaria, as was shown by the numerous blood examinations.

Typhoid, paratyphoid, and influenza were also excluded, and Deeks states that it is distinguishable from typhus by the length of the course, the milder manifestations, and the absence of the rash. Neither quinine nor salicylates had any effect upon the disease except the usual temporary antipyretic action. The disease first appeared in 5 mail clerks in the post-office, and then in 2 bachelor apartments, one coming from one house, and 14 from another. Since then the epidemic has gradually spread in the city of Panama, and it would seem that this is some hitherto unrecognized infectious disease, although one would be inclined to question whether it was not a mild typhus fever. If we omit the fact that there was no definite eruption, the description given is not at all unlike the mild cases of typhus which have been described. The incubation period is somewhat longer than the mild typhus cases, and the disease does not last as long, but when one considers that there are doubtless wide variations in the duration of the various febrile diseases, these differences are not so important.

Cancer as an Infectious Disease. There has been so much written about the parasitic nature of new growths, and so many contradictory observations have been made that one feels like waiting for some very definite information before considering this subject too seriously. There have been some studies made recently, however, which are quite well worth careful consideration. Erwin F. Smith, working on the pathology of plants, found that the growth known as crown-gall is a sort of plant cancer. This disease is caused by an organism called *bacterium tumefaciens*, and the disease may be produced in other plants by inoculating them with this bacterium. Rous has made some very striking experiments with a sarcomatous tumor of a hen. We know that certain forms of sarcoma in animals may be transferred from one animal to another. Rous, however, was able to reproduce the sarcoma by the injection of fluid which had been entirely freed from tumor cells, so that it is possible that if the subject of human neoplasms be studied from this point of view, some additional light may be obtained.

The Transmission of Infectious Diseases. Hedges¹ has contributed a short article upon the subject of contact infection, with particular reference to scarlet fever and diphtheria. From the earliest times it has been believed that these diseases are transmitted through the air and by fomites or objects which have come in contact with the patient. There is no doubt that, in certain circumstances, both these means of transmission are possible, but there is a growing opinion, based on careful scientific observation, that the danger of the transmission of infections by fomites and by transmission through the air is very slight. The transmission is almost invariably accomplished by direct contact with the individual who has the disease, and perhaps the

¹ Archives of Pediatrics, April, 1912, p. 250.

greatest sources of infection are the so-called missed cases, in which the diagnosis has not been made, and in carrier cases. For many years yellow fever was believed to be carried by the fomites, and a tremendous amount of disinfection and destruction of property were the result. In diphtheria and scarlet fever there has been the belief that the virus of both diseases could and did live after very long periods of time, and while it is possible that, under certain conditions, diphtheria bacilli may retain their virulence for months, under ordinary conditions they soon lose their vitality. For instance, Weichardt took 300 swabbings from things in a sick room occupied by a diphtheritic patient, and 250 swabs from other parts of the house, and found diphtheria bacilli only 3 times and then on objects which had been in contact with the patient's mouth. Chapin, in similar experiments, found, in 200 swabs, no diphtheria bacilli, and Williams was unable to recover the diphtheria bacilli from pencils moistened by the lips of patients who had the bacilli in their throats. Kober similarly studied houses in which there had been cases of diphtheria, and was unable to find the bacilli. Paper money would be a source of transmission of disease if fomites were of great danger, yet careful study of bank clerks and of street-car conductors shows that they do not have scarlet fever or diphtheria more frequently than other classes of people, nor has there been any evidence to show that the employees of the Treasury Department, who handle the return bills, are more subject to infections than other people living under the same conditions. Scarlet fever and diphtheria certainly do not fly through the air so that there is practically no danger through this source, and, if dust is suppressed, none whatever.

I have called attention in previous years to the work which has been done in various hospitals in treating diphtheria, and scarlet fever in the open wards, with no further protection than was afforded by a rigid technique, or so-called ritual isolation. The lesson from this is that in the past we have paid entirely too much attention to unimportant matters. The prevention of scarlet fever and diphtheria should be undertaken first in isolating cases promptly, secondly, in the discovery and treatment of carrier cases, remembering that carriers who have been in contact with a virulent case are capable of transmitting the disease to others, but that those individuals who harbor diphtheria bacilli in their throats, but who have not been in close contact with a virulent case, are probably not a source of danger to other people.

The matter of DISINFECTION should consist chiefly in the thorough sterilizing of the spoons, cups, and other utensils which are extremely liable to carry the bacilli, also the towels and bed linen. As to the room, thorough cleansing by ordinary means is probably all that is needed, although, of course, disinfection by formaldehyde or sulphur may help. As ordinarily carried out, room disinfection is more or less of a farce, and everyone who knows anything about it at all and has

observed the manner in which it is usually done, will agree with me, but it makes the people in the house feel more comfortable.

The *disinfection of the physician's hands* is another subject upon which I have changed my views. I have for years kept very careful watch upon the possibility of my having transmitted the infectious diseases. I usually wear a gown, although not always, but always take particular care not to sit down in a house in which there is an infectious disease, and not to allow my clothing or person to come in contact with the furniture or patient. For the last year I have given up using disinfectants for the hands, and have substituted thorough scrubbing with plenty of soap and hot water. I am certain that, in spite of almost daily contact with infectious diseases, I have not been the means of transmitting them in even a single instance. I think the subject is one which should be studied fully, and medical students and physicians should be taught exactly how to prevent the spread of disease, and to stop the use of measures which are apt to be misleading and give a false sense of security. I have seen, for example, a mother wonder how scarlet fever spread from one child to another when the sick child was isolated and a sheet moistened with carbolic acid solution was hung over the door, yet she, with the idea that the sheet would prevent the disease, went into the room, handled the ill child, and without any, or certainly an insufficient amount of cleansing, went immediately to the other children. This is only one instance of a hundred other similar things to which it is not necessary to call attention.

The Filterable Viruses. Wolbach¹ has given a very interesting resume of our knowledge concerning the diseases which are due to filterable viruses. Our knowledge of these diseases dates from 1898, when Loeffler and Frosch discovered that the virus of foot and mouth diseases would pass through the finest porcelain filters. The subject was next studied by Beizerinck, who discovered that a disease of the tobacco plant belonged to the same class, and subsequently it was found that Iwanowski had discovered this fact as early as 1892. Since that time some 30 diseases have been found to be due to filterable viruses. The largest number are diseases of domestic animals, including pleuropneumonia of cattle, African horse-sickness, sheep-pox, cattle plague, hog cholera, swamp fever of horses, infectious diseases of sheep and goats causing suppression of the milk, the catarrhal fever, or so-called blue tongue of sheep, the distemper of dogs, infectious stomatitis papulosa of cattle, and one or two others. A few diseases are common to man and animals, including foot and mouth disease, rabies, vaccinia, and smallpox. In birds there are fowl pest and fowl diphtheria, and chicken sarcoma. Man is not exempt, and some of the diseases have so far only been observed in him, including yellow fever, dengue,

¹ Boston Medical and Surgical Journal, September 26, 1912, p. 419.

pappataci or sand-fly fever, verruca vulgaris, molluscum contagiosum, poliomyelitis, typhus fever, measles, scarlet fever, and trachoma.

The diseases may be grouped in another way, that is, in regard to the way in which they are transmitted. Some are essentially blood infections, in which the parasite is primarily a blood parasite, and these are transmitted by intermediate pests consisting of some sort of biting insects. The mosquito transmits yellow fever, dengue, and the African horse-sickness; pappataci fever is transmitted by a form of gnat; typhus fever by the body louse, etc.

Another group requires the entrance of the virus directly into the tissue through an abrasion or injury, as in cases of rabies, molluscum contagiosum, verruca vulgaris, chicken sarcoma, and trachoma, although it is possible that this last may affect a normal conjunctiva. Poliomyelitis may be transmitted by the biting fly, although this announcement has been made very recently, and needs further investigation. Another group is transmitted by contamination with infected material, such as discharges of the eyes, from the respiratory tract, surface lesions, and excreta. These include pleuropneumonia of cattle, distemper of dogs, fowl diphtheria, and others.

Another interesting point in connection with some of these diseases is the fact that among other lesions are certain changes which are more or less specific for the particular disease. These are chiefly cell inclusions which have been particularly studied in trachoma (see trachoma), and scarlet fever (see Scarlet Fever), as well as in rabies, poliomyelitis, and some of the diseases of animals. But few of the organisms have been cultivated, the only ones being pleuropneumonia of cattle, fowl pest, fowl diphtheria, epithelioma contagiosum, and Novy's rat-disease. All of these diseases are the subject of a great amount of investigation at the present time, and many of the mysteries concerning them will undoubtedly be cleared up in the comparatively near future.

Putrid Gases and Infectious Diseases. Trillat¹ has conducted some experiments concerning the growth of pathogenic bacteria when exposed to air containing small amounts of putrid gases. Similar experiments have been carried on in previous years by various observers, with different results. There is a general impression that the breathing and living in bad odors is prejudicial to health, and that leaks in sewer pipes, and the odors from out-houses and from decaying animal and vegetable matter, are a source of disease. There has never been any proof of this, but Trillat has found that the diphtheria bacillus and the plague bacillus grow much more rapidly when exposed to such contaminated air than under ordinary conditions, and this applies both to laboratory experiments and those conducted out of doors, near sewers, and in other locations. He also attempts to account for the

¹ Archives de Sciences Physicales et Nat., June 5, 1912.

souring of milk and the changes that are prone to take place in meat immediately after thunder-storms by assuming that such storms cause putrid gases to leave the soil, and that these, in turn, stimulate the development of the bacteria which cause the changes in the milk or meat as the case may be.

The Hygienic Control of Interstate Bodies of Water. This is a subject which in this country has been very much neglected, and one which, if the health of the people is to be conserved in the future, must be taken care of. It is indeed a potent argument for the establishment of a National Department of Health. Attention has been called to this subject by various authorities at different times, and Fell¹ has published a paper upon this subject. The Great Lakes, the Mississippi, Missouri, and Ohio Rivers, and similar bodies of water are being badly polluted by the discharge of sewage, and the most important step to be pursued in preventing this is the purification of all sewage or refuse before it is discharged into the water. This is being done in some places, and the new sewerage system in Baltimore provides for a large and complete purification plant which will in a large measure prevent the pollution of the Chesapeake Bay. In addition to this, it would seem that a concerted action on the part of health officers in carefully policing all typhoid cases, and especially those on water-sheds, will be of the greatest possible assistance.

Actinomycosis Treated with Vaccines. Kinnicutt and Mixer² have reported 8 cases of this disease, 2 with abdominal, 2 with pulmonary, and 4 with cervical lesions. Up to the present time, the treatment has consisted of large doses of iodide of potash internally, together with excision or curetting and the use of copper sulphate locally, and sometimes internally. In going over the literature, they found only 4 cases which had been treated by the use of vaccines. It is quite probable that a number of different organisms have been grouped together which may lead to some little confusion. The authors cited used pure cultures obtained by thoroughly washing the separate granules from the pus in five or six changes of sterile normal salt solution. Even this will not always result in a pure culture, but they found stock vaccines to be as effective as the autogenous ones. When the organism has been once obtained in pure culture, it can be kept on hand for use. Colonies a week or ten days old are used, and these are transferred to a thick, sterile tube and thoroughly ground up by means of a glass rod. A little salt solution is added; the tube is drawn out and sealed in the ordinary way, and kept in a water bath at 60° C. for one hour. After sterilization the contents of the tube are transferred to a bottle containing 50 c.c. of sterile normal salt solution, and 1 to 400 lysol or phenol. It is impossible to standardize such a vaccine

¹ Journal of American Medical Association, December 23, 1911, p. 2055.

² Boston Medical and Surgical Journal, July 18, 1912, p. 90.

except in a rough way, and for that reason a very small dose should be used in the beginning. The first dose may be 0.1 c.c., and this may be repeated every three or four days, increasing the amount 0.05 to 0.1 c.c. each time until a dose of 0.75 c.c. has been reached. Larger doses than this do not seem to have any advantage. The results are interesting. Both abdominal cases were severe. One apparently made a complete recovery after two months' treatment and the other died. The 2 thoracic cases were both advanced, and both died. Three of the 4 cases involving the jaw and neck apparently made a complete recovery, while one is rapidly improving. From their limited experience, the authors believe that the superficial cases of actinomycosis may be greatly benefited or cured, but cases with extensive involvement of the internal organs do not appear to be amenable to treatment.

Anthrax and Salvarsan. Becker¹ has reported a case of septicemic anthrax. It was cured by a single intravenous injection of 0.60 gram of salvarsan. Schuster² has made a study of the action of salvarsan in experimental anthrax in rabbits. He found that if he gave simultaneously a septicemic inoculation of the anthrax bacillus sufficient to kill the control animal, and an intravenous injection of salvarsan of 0.04 centigram per kilo of the animal's body weight, the rabbit would survive. The rabbit would also survive in cases in which the injection was made twenty-four hours after the inoculation.

The Balantidium Coli as a Cause of Disease. This organism has received considerable attention of late. There is a certain amount of difference of opinion concerning the amount of disease which it causes. Bowman³ has made a study of this parasite which was in cases seen in Manila. This organism is a small oval body about 0.1 mm. in length, and the hog is thought to be the most common host, but the method of transmission to man is somewhat obscure. The cases in which the organism is found somewhat resemble infections with the ameba, and they suffer from a mild intermittent diarrhea, each attack becoming more severe, until the disease resembles dysentery. There is usually considerable indigestion, flatulence, and pain in the lower part of the abdomen. These symptoms sometimes disappear very suddenly without any treatment, to recur a few weeks, or months, later. Sometimes the patient dies of exhaustion, and sometimes as the result of perforation. In the first stages the organism is found in the feces during the attacks of diarrhea, but it is usually absent between the attacks. The blood-picture varies; leukocytosis has been reported, but Bowman did not note this change in his cases. There is usually a marked eosinophilia, but the very common occurrence of intestinal parasites in the natives of tropical countries renders this of little value

¹ La Semaine Médicale, 1912, p. 89.

² Münchener medizinische Wochenschrift, February 13, 1912.

³ Journal of the American Medical Association, December 2, 1911, p. 1814.

in diagnosis. The diagnosis can only be made by finding the organism and excluding other intestinal parasites. The organism causes a chronic ulceration which is usually limited to the colon; these ulcers are large and irregular, and there is nothing to distinguish them from those caused by the ameba. The organism has been reported in an epidemic of dysentery in orang-outangs, and also in monkeys (the *macacus cynomolgus*). Experimental attempts to affect the same variety of monkeys have failed. The treatment of the disease is very unsatisfactory, but various intestinal antiseptics, such as betanaphthol or thymol, may be tried.¹

Cerebrospinal Fever. Frost² has reviewed the various facts concerning the etiology, transmission, and specific therapy of this disease, with particular reference to public measures for its control. Among the points which I have not heretofore noted in PROGRESSIVE MEDICINE, there are several observations of considerable interest. The occurrence of the meningococcus has been the subject of very extensive studies, and, in individuals who have cerebrospinal fever, the organism, according to some observers, can be demonstrated in all cases, while other observers have found it present in only part of their cases. The difference is probably one of methods, and it is highly probable that, if exact methods are used, the organism could always be demonstrated in the cerebrospinal fluid. Further studies have been made to determine the presence of the organism in the nasopharyngeal secretions of patients, and von Lingelsheim was able to isolate the meningococcus from the throat in 182 out of 787 cases examined; these figures include a number of specimens examined under unfavorable circumstances and those sent to the laboratory from a distance. The organism is demonstrable in the nasopharynx most constantly in early stages of the disease, most of the cases showing it in the first week; after that there is considerable falling off, and but a very small percentage show it after the third or fourth week. As early as 1901, Albrecht and Ghon isolated the meningococcus from the nasopharynx of a healthy person who had been in contact with a meningitis patient. Since that time numerous studies have been made, and it has been demonstrated that apparently healthy persons in the immediate vicinity of cerebrospinal meningitis very frequently act as carriers of meningococci, and the organism may be demonstrated in the nasopharyngeal secretions. It has also been determined that apparently healthy persons, who are not in contact with any known case of meningitis, but who reside in communities where there is an epidemic of cerebrospinal fever, may be meningococcus carriers. In communities where there have only been scattered cases, meningococcus carriers are found with less frequency, and the organism is very rarely found in persons who are residing in

¹ PROGRESSIVE MEDICINE, March, 1911, p. 124.

² Public Health Reports, January 26, 1912, p. 97.

communities which are quite free from the disease. Various Germans have studied these meningococcus carriers and have classified them as periodic, in whom repeated examinations have shown alternating periods of freedom from meningococci and reappearance; as persistent carriers in whom the organism was found constantly for several weeks or months, and temporary carriers in whom the organism was found only for short periods. Very little is known about the life history of the organism outside of the human body apart from laboratory cultures. It is quite probable that the organism dies quickly when it leaves its host, and it is well known that it is extremely susceptible to the action of chemical disinfectants, and also to direct sunlight. It is quite probable that, in particles of sputum or pus, the organism may live for some time, but even in these it is probable that it dies within twenty-four hours. The local causes of an epidemic are not at all clear; such studies as have been made seem to exclude the probability of infection through water supplies, milk, or foodstuffs.

The meningococcus has never been found outside the human body apart from cultures or in experimental animals, and it is highly probable that the only natural habitat is the human body. It probably multiplies in the human body, and lives but a short time when separated from it. It is also quite probable that the site of infection is the nasopharynx; this is inferred from the common occurrence of the meningococcus in this location in the early stages of the disease, and because it has been demonstrated at this point in carriers. The source of infection would seem to be (1) those individuals who are suffering from cerebrospinal fever, and (2) the carriers; it is quite possible that the organism is transmitted from one person to another by such contact as ordinarily occurs between people associated together—that is by the transferring of secretions, by kissing, by the use of common eating or drinking utensils, the use of the same handkerchiefs or towels, the soiling of the fingers with secretions, etc. Just why some people develop the disease and some do not, and why some act as carriers, has not yet been determined, but it is quite possible that there are differences in the virulence of the meningococcus and differences in the amount of susceptibility on the part of the individual. It is more common in children, and, apparently, the susceptibility becomes lessened in adult life. The susceptibility is apparently greater in the winter or spring, and possibly the meningococcus is more virulent in these months than at other times. The disease tends to recur in epidemic form at more or less regular periods; just why this should be so is not at all clear, and this peculiarity is not limited to cerebrospinal fever, but is noted in influenza, measles, and other infectious diseases.

Measures for the control of the disease are very important, for not only is the disease a very fatal one, but those persons recovering from

it are very liable to have undergone serious damage, to be left blind, deaf, or feeble-minded, or sometimes paralyzed in one or more extremities. The prevention of the disease should be carried out by reporting all cases, even suspicious ones, to employ, if possible, an expert diagnostician and an expert bacteriologist in the pay of the health department, to study all such cases; the isolation of all patients, the same disinfection of the nasopharyngeal discharges as for diphtheria; where practicable the restriction of communication between the associates of the patient and others; and, in severe epidemics, the schools should be closed and public gatherings prohibited. It is quite possible that the administration of hexamethylenamin may be of some value as a prophylactic, though this has not as yet been worked out. The reduction of the mortality by the direct treatment of the disease by the use of serum, I have already commented on in *PROGRESSIVE MEDICINE* in the previous two years.

THE GLOBULIN REACTION IN THE CEREBROSPINAL FLUID. The differential diagnosis of the various infectious diseases is a subject of very great practical interest, and many studies of more or less value have been made with the end in view of supplying a simple reliable method for diagnostic purposes. The examination of the cerebrospinal fluid has been made a subject of a great deal of study, and one very ingenious method has been recently suggested by Braun and Husler.¹ In making studies of the complement containing the cerebrospinal fluid, Ferrata and Brand found that it could be precipitated from the cerebrospinal fluid in connection with the serum globulin. Weil and Kafka² have shown that in general paralysis the amboceptor only is increased, while, in meningitis, both the complement and amboceptor are increased, so that an increase in the globulin would mean a point in favor of the diagnosis of meningitis and the exclusion of general paralysis. The difficulty has been that the reaction necessary to determine this are difficult to make. Braun and Husler have suggested that 1 c.c. of cerebrospinal fluid be used, and to this are added 1 c.c. at a time of a solution of three-hundredth-normal hydrochloric acid. If no precipitate forms after 5 c.c. have been added, the reaction may be considered negative. The mixture should be examined against a dark background, and compared with the tube containing only the acid solution. It is desirable that a freshly prepared solution of the acid be used and it is a good plan to allow two hours to elapse before the result is definitely pronounced negative, but, in most instances, the reaction occurs early. The reaction has been made in a large number of different conditions, in tuberculous meningitis, and in meningitis due to various organisms, as well as numerous diseases in which one would not expect to find the reaction present. It was posi-

¹ *Deutsche medizinische Wochenschrift*, 1912, vol. xxxviii, p. 1179.

² *Wiener klinische Wochenschrift*, 1911, vol. xxiv, p. 335.

tive in meningitis cases, negative in the others. If the fluids are turbid when withdrawn, the reaction is of little value. The simplicity of this reaction should appeal to the clinician, and in cases of a doubtful nature a trial of it should certainly be made.

THE DIAGNOSIS OF CEREBROSPINAL FEVER. Grysez¹ has suggested a new diagnostic procedure in cerebrospinal fever, which consists in injecting into the spinal canal of the guinea-pig from 0.5 to 0.75 c.c. of the cerebrospinal fluid removed by means of a lumbar puncture of the patient under observation. Death of the guinea-pig takes place in from two to twenty-four hours afterward, with a lowering of the temperature of from 4° to 8° C. The cerebrospinal fluids from other diseases either cause an elevation of temperature or an insignificant lowering.

A NEW SIGN OF CEREBROSPINAL FEVER. Holmes has called attention to an interesting sign observed in cases of cerebrospinal fever which consists of partial or complete anesthesia of the conjunctiva and the cornea. He has seen it in about half the cases, and it is apt to be more marked in the severer ones than in the milder forms. He has not seen it in any of the other diseases presenting meningeal symptoms.

THE ADMINISTRATION OF SERUM IN CEREBROSPINAL FEVER. There are probably few people in this country who can speak with more authority on this subject than Sophian.² He has become particularly well known in the recent epidemic in Dallas, Texas. In becoming dissatisfied with the older methods employed in regulating the dose, he attempted to find some more reliable way, and published a preliminary report of his investigations. His first experiments were conducted along the line of determining the pressure of the cerebrospinal fluid. This was found to be unsatisfactory, and he subsequently studied the blood pressure. The effect on the blood pressure of drawing the fluid by lumbar puncture in meningitis is not constant; usually there is a drop in the blood pressure, and, if large quantities of fluid have been withdrawn, the drop may be correspondingly large. Sophian ordinarily stops withdrawing the fluid if there is a drop of 10 mm. in adults, or 5 mm. in children. Sometimes the pressure drops very quickly while the fluid is removed, and the blood pressure is then a guide indicating how rapidly, or how slowly, the fluid can be withdrawn. In some instances, there is no change in the blood pressure, and, in others, there may be even a rise. In these cases, the fluid may be withdrawn until the cerebrospinal pressure is normal, this being determined by counting the drops of fluid as they flow from the needle—one drop of fluid from every three to five seconds corresponding roughly to the normal pressure.

Sophian finds the gravity method of injecting the serum preferable

¹ *Comptes Rendus Societe Biol.*, March 8, 1912, vol. lxxii, p. 369.

² *Journal of the American Medical Association*, March 23, 1912, p. 843.

to using the syringe, and, contrary to what might be expected, the blood pressure drops and continues dropping steadily as the serum is injected. After the blood pressure has dropped from 20 to 30 mm., if more serum is injected the pressure will fall relatively much more rapidly. The method advised is to have an assistant take the blood-pressure readings throughout the whole operation. In a general way, the more slowly the serum is injected, the less rapidly will the blood pressure fall. In using the gravity method, the serum is allowed to run in slowly, the funnel being raised or lowered to regulate the flow. The barrel of a 10 to 15 c.c. antitoxin syringe may be used as the funnel, and this may be attached to 12 inches of rubber tubing, about $\frac{1}{4}$ inch in diameter. Ten minutes may be considered as an average time for the fluid to run in, but, where the blood pressure is low to start with, or where it drops quickly, twenty minutes longer may be employed. In using a syringe, it is more difficult to regulate the rate of injection. Occasionally there is an initial rise in blood pressure after the injection of a few centimeters of serum, followed by a subsequent drop, as larger quantities are injected; very rarely the blood pressure shows a rise instead of a fall. Since using this method, Sophian has averaged smaller doses than formerly, often not more than 15 c.c. with an average of from 20 to 25 c.c. for adults, and children in proportion. Sometimes, when the blood pressure permits, 30 to 40 c.c. may be used, but he is of the opinion that it is rarely necessary or beneficial to inject over 40 c.c. The symptoms that are associated with the drop are stupor, which deepens as the pressure falls, the respirations become superficial and irregular, although at times they may be deep, slow, and irregular. If there is a very large drop in the blood pressure, the breathing may stop suddenly. As a rule, the pulse continues good, even with a large drop in the blood pressure, and even with marked change in the breathing; sometimes it becomes slow and irregular, and the information derived from the pulse may be regarded as very misleading. There is dilatation of the pupils, increasing with the fall in blood pressure. Incontinence of feces and urine during the lumbar puncture usually accompanies a fall in blood pressure, and should be a warning to cease removing the fluid or its injection, as the case may be. If the blood pressure falls rapidly, the injection of the serum should be stopped. If it continues dropping, and is accompanied by the above symptoms, a portion of the serum injected should be immediately removed. If the gravity method has been used, this is usually done by lowering the funnel. If the breathing stops, as much fluid as possible should be removed, and active artificial respirations begun. Epinephrin may be injected into the muscles, or atropin may be used, or other vasomotor stimulants. The results are usually very satisfactory. Epinephrin administered before the puncture will tend to prevent the large drop in blood pressure on injecting the serum, but

Sophian prefers not to use it except in the cases with initial low blood pressure. General anesthesia is, as a rule, not to be used, except where it may be rendered absolutely necessary in violent patients. Patients who are unconscious, or even delirious, will suck water through a straw or tube, and this frequently was a useful means of keeping them quiet. Sophian calls this water anesthesia.

PROPHYLACTIC VACCINATION AGAINST CEREBROSPINAL FEVER. As far as I know, up until very recently nobody has even suggested the possibility of producing immunity with the view of preventing cerebrospinal fever. The disease is one with such a striking clinical picture that it causes, in the public mind, a sort of terror and any method of preventing it which could be used in the face of a threatened or existing epidemic would be most welcome. It was formerly believed that, as a rule, only one case occurred in a family, but the recent Texas epidemic shows a number of instances in which two members developed the disease, and sometimes even three, four, and five members of a family became infected. The members of the family of the patient with cerebrospinal fever and those associated with the patient are liable to become carriers, so that the disease may be spread by those who are not commonly regarded as a source of danger.

Sophian and Black,¹ have suggested the use of a vaccine prepared and used along similar lines as typhoid vaccine. The vaccine which they used is prepared by first neutralizing all glassware. They used an organism about five generations old, isolated from cerebrospinal fluid of one of the patients in Dallas, Texas. This was grown on 2 per cent. glucose agar, and, after eighteen hours, was washed off with distilled water, shaking for twenty minutes and then heated at 50° C. for one hour and tested for sterility. It was counted by the Wright method and standardized. Observations were made upon 11 students who were inoculated subcutaneously just below the deltoid. Five were injected with 5,000,000 bacteria as the first dose, and 5 with 1,000,000,000. A week later they were vaccinated again with twice these doses, and, after another week, with 2,000,000,000 of the freshly prepared vaccine. The individuals were studied from the standpoint of agglutination complement and fixation and clinical symptoms. For a few days following the vaccination there is a leukocytosis. About four days after the first injection, the immune bodies appear and increase rapidly, after the other injections. At the end of the third week, there was apparently a high degree of immunity, as demonstrated by the complement fixation test. As far as it was possible to judge, the larger doses did not produce any higher immunity than the smaller ones. One of the students did not develop a very high degree of immunity. Local reaction is very much like that following the typhoid vaccine, that is, about four hours after the injection there

¹ Journal of the American Medical Association, August 17, 1912, p. 527.

is an area of redness, with some swelling and induration. This area may be painful and tender, and the lymph nodes near it may become somewhat enlarged and tender. Reaction disappears in twenty-four hours or shortly after. After the other injections the local reaction may be more marked. The general reaction is also like that of typhoid vaccine. There may be no symptoms whatever, or, in some individuals, slight malaise, headache, and a little temperature for about twenty-four hours. Occasionally, severer constitutional symptoms are present. It is important to know that the soluble products of the dead meningococcus apparently irritate the meninges, so that, for a few hours, there may be severe headache, vertigo, vomiting, photophobia, and some pain in the back of the head. The other active signs of meningitis are not present. These symptoms are unusual, but should be remembered in case the vaccine is used, otherwise one may become unnecessarily alarmed. The value of this method of vaccine will have to be determined.

Hall, of Kansas City, vaccinated about fifty families consisting of about 280 people. All of these had been exposed to the disease in their own family, and all were given three full doses. In addition, a number of nurses and physicians were vaccinated and not one of these individuals contracted the disease. In Dallas, about 100 were vaccinated, most of whom, as far as could be learned, did not have the full number of injections. Only irregular records were kept, and there was no examination of the blood to determine the degree of immunity produced. Two nurses, each of whom had had two injections, developed the disease some weeks after the vaccination, and both recovered. Too much stress should not be laid on this experience, however, as after incomplete vaccinations of any kind, attacks of the disease are liable to happen occasionally. The only objections which may be urged against the use of vaccine are the slight temporary and local reaction, which, as a rule, does not amount to much, and the somewhat theoretic objection that a negative phase might be produced during which the disease might develop. Sophian and Black have discussed this and suggest that it might be obviated by taking preliminary cultures of the nose and throat, and, if the culture is positive, using local treatment until the organisms disappear. As a matter of fact, there is probably very much greater danger of the individuals developing meningitis without the vaccination than there is of their developing the disease in a negative phase produced by the injection. In six instances in which positive carriers were vaccinated, the nose and throat cultures became negative a week later without any further treatment.

Vaccination in Cholera. Piga¹ has reported his results with the methods suggested by Ferran. The observations made during the epidemic of

¹ *La Clinica Moderna*, March 1, 1912, p. 141.

cholera in 1885, and the results obtained, were very striking, although the method has been much criticised. For example, in one small village 648 persons were inoculated, 500 of which were reinoculated, and only 2 of these took cholera, and both of these in a very benign form; the others in the population suffered severely, there being 521 cases with deaths. Grouping the results obtained in a number of different places showed, in 306 cases, 283 had not been inoculated, 23 had been inoculated, and there were no cases among those who had been re-inoculated. In 192 deaths, 186 had not been inoculated, only 6 having received the inoculation. There were no fatal cases among those who had been re-inoculated.

Colon Bacillus Infections. Kemp¹ has called attention to the various forms of infection with the colon bacillus, which is well known as most frequent in the genito-urinary tract, but which may also cause inflammation of the gall-bladder, abscesses, pelvic exudates, and numerous other manifestations. A curious point in regard to the diagnosis, when the genito-urinary tract is involved, is that the colon bacillus, unlike other bacteria, does not cause a decomposition of the urine, giving an alkaline reaction and ammoniacal odor, but the urine remains strongly acid; this is probably not a constant finding, but is extremely suggestive. The most interesting part of Kemp's paper consists of a report of a case of general infection with the colon bacillus, in which the bacillus was found both in the urine and in the sputum; there was a double pyelitis, cystitis, a double pneumonia, purulent bronchitis, two attacks of colitis, and a myocarditis, covering a period of four to five months; the patient finally made a good recovery.

The question of treatment of these infections is very important; perhaps the best results have been obtained by the use of hexamethylenamin and sodium benzoate, 10 grains of each being given every three hours by mouth, or by rectum if there is vomiting or coma. Later on, if there is excessive acidity or irritation, the sodium benzoate is best omitted, and Vichy water or potassium citrate may be given. The dosage should be such that the urine is either neutral or faintly acid. It has also been suggested that tablets containing lactic acid bacilli may be used to advantage. In cases in which the infection is chronic, or which do not respond to treatment, vaccines, preferably autogenous, may be used, beginning with 100,000,000 and increasing to 300,000,000, and finally to 1,000,000,000, reaching the larger doses gradually and with intervals of from four to seven days. Dudgeon has suggested the use of an antibacillus coli serum. This has not been used in a sufficient number of cases to know anything concerning its value.

Diphtheria. THE PRODUCTION OF IMMUNITY WITH OVERNEUTRALIZED DIPHTHERIA TOXIN. There is a popular idea that antitoxic serums

¹ Boston Medical and Surgical Journal, November 30, 1911, p. 819.

are produced by immunizing an animal with the toxin alone. Quite early in the work of immunity, Babes, in 1895, suggested the production of immunity by using toxin which had been neutralized with antitoxin. Early experiments along this line were not satisfactory, but, in 1902 and in subsequent years, Theobald Smith succeeded in producing immunity by this method, and McClintock and Ferry¹ have succeeded in producing immunity in horses by the use of overneutralized mixtures of diphtheria toxin and antitoxin, and they found that this immunity could be produced just as rapidly and more safely than when the toxin alone is used. This whole subject is one which will need to be thoroughly studied, and it is quite possible that new and very practical results may be obtained, not only in diphtheria immunity, but in other diseases as well.

DIPHTHERIA ANTITOXIN. A very practical method of keeping diphtheria antitoxin on hand has been devised, which should appeal particularly to physicians living in small towns or where an ample supply of antitoxin cannot be obtained quickly. This consists in the use of *antidiphtheritic globulins* in the dry form. These globulins are prepared in the same way as those made in a solution, and are supplied in small glass bulbs, together with small sealed bulbs of sterile water. When it is desired to use the antitoxin, the dry globulins are dissolved in the sterile water and the solution thus obtained, which is ready for injection in a few moments, is administered with the ordinary hypodermic syringe. These dry globulins keep a long while without any decrease in strength, and the busy physician will find that much time will be saved by carrying one or two doses in the emergency bag.

Another hint, which will hardly seem necessary to give, is not to save antitoxin after the original container has been opened. There is always danger of the solution becoming contaminated, and serious results may follow the use of spoiled antitoxin which not only has a bad immediate affect, but also causes antitoxin to be improperly held to be responsible for the trouble that results.

DIPHTHERIA VACCINE AND DIPHTHERIA CARRIERS. Hewlett and Nankivell² have studied the question of diphtheria carriers which have been for some years the source of considerable difficulty on the part of those having to deal with the question of the control of diphtheria.

The methods of local and internal treatment previously used have been notoriously unsuccessful. The use of antiseptics locally, such as iodine, has not given the brilliant results that were desired, and the spraying of the throat with pure cultures of the staphylococcus, while apparently giving more or less satisfactory results as far as has been reported, is a method which will probably never come into very general use (see same). Complete isolation, of course, works very well, but is

¹ From the Research Laboratory of Parke, Davis & Co., 1912.

² Lancet, London, 1912, vol. clxxxiii, p. 143.

a hardship and, in many cases, if not impossible, at least very impracticable. Hewlett and Nankivell have studied the question of producing a vaccine which they did by growing diphtheria bacillus on blood serum or blood agar, and then collecting the growth and thoroughly washing with normal salt solution. The bacteria were then separated by the use of the centrifuge, and the bacteria ground in intense cold and then filtered through a Berkefeld filter. Sterile salt solution is then added to make a solution containing either 2 or 5 mg. per cubic centimeter of the ground bacteria.

At first very small doses were used, varying from 1.05 mg. to 1 mg. Later the dose was increased to 2 mg., and after a week to 5 mg. As a rule, there is only slight reaction, consisting of redness about the site of the injection. Sometimes there may be a general reaction, with nausea and fever. The strength is lost to a considerable degree after three months. Thirteen chronic carriers injected with this vaccine showed the disappearance of the bacteria in a very short time. In six instances patients so treated continued to have the bacilli in their throats, although in smaller numbers.

Petruschky,¹ working independently, has used injections of bacteria killed with chloroform and then washed. He suggests that this method be used for purposes of immunizing chronic carriers and possibly also of school children.

If this method of dealing with diphtheria carriers is worked out practically, it will be a great step in the eradication of the disease from school, and, in fact, from communities in general.

THE STAPHYLOCOCCUS TREATMENT OF DIPHTHERIA CARRIERS. I have called attention to this once or twice before, and the subject would seem worthy of another brief note on account of its being a very sure method of dealing with certain diphtheria carriers. In spite of the good results obtained, one hesitates to recommend this method for general use until it has had a very much more extensive trial by competent observers. It was first suggested by Schiotz in 1909, and he got his idea from the fact that a patient with a staphylococcus sore throat did not contract diphtheria when exposed to it, and also that several convalescents cleared up with unusual rapidity after an attack of staphylococcus sore throat. Six individuals having the diphtheria bacilli in their throat were treated with a staphylococcus spray, and all recovered. Page has reported a case which yielded to this treatment after the diphtheria bacillus had persisted in the throat for three months after the disappearance of local symptoms. A number of other observers have used it with success, and it must be said, apparently without any bad results.

Lorenze and Ravenel² have made a short study on this subject, and

¹ Deutsche medizinische Wochenschrift, 1912, vol. xxxiii, p. 1319.

² Journal of the American Medical Association, August 31, 1912, p. 690.

have reported their results, grouping them in classes. In Class 1 are the carriers who have never shown any clinical manifestations of diphtheria. In Class 2 were placed patients with varying degrees of local change. In Class 1 the results were uniformly good, some six applications usually being sufficient to clear the throat of diphtheria bacilli. In 6 cases in Class 2, with large doses of antitoxin, and the use of local antiseptic treatment, the bacilli were present on an average of seven weeks. On the cessation of all treatment and the use of the staphylococcus spray, 4 of the cases cleared up within one week, and in 2 of the cases the results were not so satisfactory. They advise the use of a combined nasal and throat spray to be used at four-hour intervals on two succeeding days, and the swab for examination should be made on the third day. They used a fresh suspension of the *Staphylococcus pyogenes aureus* in normal salt solution, or else a bouillon culture twelve hours old. An effort was made to keep the spray in a temperature of about 96° F., and it was first sprayed into the pharynx and over the uvula and both tonsils, and then into each nostril until the mucous membrane was thoroughly covered. The only bad results from the staphylococci was a slight coryza from 3 patients and an exceedingly mild laryngitis in one, and small furuncles at the tip of the nose in 2.

SPASMOGENIC DIPHTHERIA. Bitot and Mauriac¹ have published in detail an instance of diphtheria of what might be called the tetanic type, in which there was no apparent membranes. The first observations were made in 1901, and last year Duare published a thesis,² and he was able to find only 15 cases. Thirteen were in children aged under eight years, 1 in a medical student, and 1 in a nurse, the last 2 patients presenting only very short attacks of trismus in the course of an ordinary diphtheria. Irving Snow, in this country, has called attention to the existence of tetanic symptoms in diphtheria. In 1903, Bitot published two observations under the title of pseudotetanic diphtheria, and both of these patients were cured by the use of the antidiphtheritic serum. In 1905, Babonneix³ published a remarkable article upon the same subject. The case reported by Bitot and Mauriac was in a man, aged sixty-six years, a farmer by occupation, who entered the hospital November 6 on account of some tetanic attacks. The patient had been well all his life, with the exception of a paralysis of the three fingers of his left hand about a year and a half previously. This disappeared in about three months. On October 18 he had his first attack, which consisted of stiffness and moments when there were opisthotonos and trismus. The patient then became unable to open his mouth, and a day or two later the arms became stiff, and two days later the legs

¹ Gazette des Hopitaux, May 2, 1912.

² Contribution à l'étude de la diphtérie spasmodique, Thèse de Bordeaux, 1911.

³ Revue des Maladies de l'Enfants, 1905, vol. xxiii, p. 8.

were affected. There were frequent crises, sometimes as many as 72 a day. When the patient entered the hospital, he had the sardonic expression of tetanus, generalized contractures, trismus, and retraction of the head. He was at once taken for a case of tetanus, and 20 c.c. of antitetanic serum were given. The patient had a slight temperature at this time. Cultures made from the nasal mucus and from the saliva showed the presence of diphtheria bacilli and staphylococci. The patient was given an injection of diphtheria antitoxin, and, on the following day, a second injection was given. Diphtheria bacilli were still found present in the mouth and nose. The following day the patient was somewhat better. He was given a third injection of antitoxin, and also a fourth injection the next day. The patient improved rapidly, and some three days later the diphtheria bacilli had almost entirely disappeared from the nose and throat, and the patient left the hospital December 22, entirely cured.

One is inclined to believe that, owing to the extreme rarity of tetanus symptoms in ordinary diphtheria, these cases which have been reported are really cases of tetanus with what might be regarded as an accidental association of the diphtheria bacillus; in other words, cases of tetanus in diphtheria carriers. Still, in a disease as unsatisfactory to treat as tetanus, the making of cultures in the nose and throat will always be a subject of interest, and repeated observations may throw more light upon this very questionable subject.

WOUND DIPHTHERIA. Diphtheria of wounds, and also of the skin, is not a very rare occurrence, yet very many times the diagnosis is not made, simply, perhaps, because the physician does not have in it the list of possibilities. In most instances the infections are secondary to a diphtheria that is recognized, and these cases offer less difficulty in diagnosis than those in which there is no history of exposure and no throat lesions. Sagar¹ has related a very interesting example of a girl, aged twelve years, who stuck a splinter in her foot. The mother dressed the wound with a piece of adhesive plaster, which she took off some two weeks later when there was a very ugly looking wound along the internal border of the left foot, consisting of an ulceration 4 cm. long, 2 cm. broad, and about 2 mm. deep. The edges were not swollen, but the whole of the ulcer was covered with a yellowish, adherent membrane. Local applications of 2 per cent. nitrate of silver were made for eight days, after which dressings of boric acid were applied. The wound cleaned slowly, and took about a month to heal. During this time the health of the child was excellent, although on some days there was slight fever. About a month after the wound the child found that she could not read, and it was found that, while she was emmetropic, there was paralysis of the muscles of accommodation. At the same time, there was an enlargement of the heart and a

¹ Hospitalstidende, June 12, 1912.

rapid, irregular pulse. After some three weeks these symptoms disappeared. There is scarcely any doubt that this is a very beautiful example of a wound diphtheria, in which the true nature of the disease was not suspected until the appearance of the myocarditis and the paralysis of accommodation.

THE TREATMENT OF DIPHTHERIA BY HEAT. Rendu¹ has made some interesting observations on this subject. It is well known that a heating of 58° C. suffices to destroy bouillon cultures of the diphtheria bacillus. Portions of the false membrane were heated at various degrees for various lengths of time, and it was found that a temperature of 60° C., maintained for five minutes, was sufficient to kill all the diphtheria bacilli contained in the false membranes from a very virulent case. In another series of experiments, the same observer found that the false membrane heated for fifteen minutes at 50° C., or ten minutes at 60° C., or for two minutes at 70° C., or for one minute at 80° C., were rendered free from living diphtheria bacilli. Rendu then made experiments on himself. In breathing hot air, he found that he was able to breath super-heated air without any further symptoms than a certain dryness of the throat. He has since tried this method on three patients with diphtheria, one aged three years, one aged sixteen years, and one aged eighteen years. In one case, air 60° C. was breathed from fifteen to twenty minutes, one at 85° for seven minutes, and one at 80° for five minutes. All 3 cases recovered, 1 with remarkable rapidity. Diphtheria antitoxin has been used in connection with this form of treatment, so that its exact value could not be determined from the experiment. This method may, however, be of some value in the treatment of diphtheria carriers, or possibly in late and resistant cases of diphtheria.

THE MANAGEMENT OF CARDIAC FAILURE IN DIPHTHERIA. Coghlan² has contributed a short article concerning the practical treatment of certain forms of cardiac failure. Among these is the so-called cardiac vomiting. The most serious type of cardiac failure met with in diphtheria is associated with persistent vomiting. It should always be suspected when the patient, suffering from severe diphtheria, begins to vomit after the seventh day of the illness. The diagnosis may be more or less difficult, and it should be borne in mind that scarlet fever starts with vomiting, and that the serum reaction may also start with vomiting and cardiac depression. The probability of the vomiting being due to myocardial changes is increased when there has been a very severe type of the disease, and particularly when the pulse-rate increases out of proportion to the rise of temperature. Roughly speaking, the pulse increases about ten beats per minute for each increase of 1° F. of the temperature. The heart should be listened to,

¹ Lyon Médicale, January 21, 1912; La Semaine Médicale, July 10, 1912, p. 326.

² British Medical Journal, March 9, 1912, p. 534.

and if there is the presence of an extrasystole, either with or without a consecutive intermission of the heart's action, the prognosis is very grave. Reduplication of the first sound, followed by an accentuated second sound, is also very suggestive. There may be pains in the chest and left arm, and a sense of constriction. Sometimes the pain is referred to the epigastric region. It may be suspected of being cardiac in origin when it is relieved by hot applications over the precordial area. The liver is generally enlarged, and the amount of urine secreted rapidly diminishes. The patient should lie with the head low, and the foot of the bed be elevated. The body heat should be maintained by the use of hot-water bottles, and as there is a great tendency to be restless and throw the covers off the body it should be protected by sufficient clothing. All nourishment by the mouth should be stopped, and systematic rectal feeding begun. The thirst is allayed by the administration of either normal saline solutions by rectum, or by what I think would be an improvement on this, the use of plain water, and, later on, small quantities of iced water or cracked ice may be given when the stomach is quiet. Mixtures of boric acid and glycerin diluted with water may be painted over the mucous membranes of the mouth to relieve the dryness. Constipation should be relieved by an enema of glycerin and water, but no purgatives should be attempted by mouth. Various drugs have been suggested, chiefly strychnin, atropin, and adrenalin. Coghlan suggests the following formula, the doses indicated being those for an adult of average size: Atropin sulphate 0.01 grain, strychnin hydrochloride 0.01 grain, adrenalin chloride (1 to 1000) 5 minims, and water to make 10 minims; this may be administered hypodermically every four hours. Better results have been obtained by using combinations of the heart stimulants and can be secured by using one stimulant alone.

The Treatment of Amebic Disease with Emetine. Rogers¹ has recorded some remarkable results, both in cases of acute and chronic amebic dysentery and acute hepatitis, which he has obtained by the subcutaneous injection of soluble salts of emetine. It is well known that ipecacuanha, when given by the mouth or, better still, by Beck's method by the use of the duodenal tube, has been the best method we have had of treating amebic disease.

Rogers' results are apparently far superior and attended with less discomfort on the part of the patient, and if his experience is borne out by other observers the subcutaneous administration of emetine will replace other forms of ipecacuanha medication in amebic disease. He has used the drug in the various classes of cases. In extremely acute amebic dysentery, with marked thickening and tenderness of the bowel, and the high leukocyte count in which the prognosis is usually very grave, and in which Rogers had previously had only

¹ British Medical Journal, August 24, 1912, p. 405, and *ibid.*, June 22, 1912.

about 15 per cent. of recoveries in spite of the administration of large quantities of ipecacuanha by mouth, the results were far more satisfactory. From 1 to $1\frac{1}{3}$ grains of emetine were administered for three days. In 2 cases the pain and tenderness rapidly disappeared, and by the fourth day the leukocytosis had disappeared and the patient was convalescent. Complete recovery took place within three weeks. In another case of the same type in which there was gangrene of the bowel, the patient died on the third day, after having had three 0.5 grain doses of emetine on the first day, and two 1 grain doses on the second. In this case the postmortem examination and subsequent careful examination of the ulcers failed to reveal any parasites, and it would appear that, in spite of the very severe nature of the disease, the $3\frac{1}{2}$ grains of emetine acted as a specific and explains the remarkable results obtained in the other cases. Similar results were obtained in the moderately acute cases of amebic dysentery. In these cases the patients were given two 0.5 grain doses the first day, and a like amount on the second day, and after the first forty-eight hours the change for the better was always very apparent, and a rapid cure followed. Similar results have been obtained in chronic amebic dysentery of several years' standing. As an example, one case of a man, aged twenty-five years, who had four or five stools containing blood or mucus daily for six months, 0.5 grain of emetine once a day for three days was followed by an immediate cessation of all symptoms, and this persisted until the time of the report. He adds 2 new cases of acute hepatitis in which the symptoms were suggestive of beginning liver abscess, and, in one case, an abscess developed from which the patient died in spite of the administration of the drug. The walls of the abscess failed to reveal any living ameba. Remarkable results were obtained in 2 other cases of abscess of the liver by using injections of emetine, and, at the same time, aspirating the abscess cavity and injecting 1 grain of emetine hydrobromide dissolved in 2 ounces of sterile salt solution into the abscess cavity. Another very remarkable case was an amebic abscess of the spleen which was cured by a similar procedure. Either the hydrochloride or the hydrobromide of emetine are equally useful, the former being more soluble. The injections of this salt are not followed by any vomiting or depression. The salts can be safely boiled for a short time, but a better procedure is to boil the salt solution first and then add the emetine. The solution may be obtained already sterilized and put up in sealed ampoules, which is perhaps the most satisfactory method of using it.

Bacillary Dysentery. The subject of dysentery has not received enough attention from the standpoint of public health and prevention. For the ordinary purposes of practice, it is a very good plan to divide dysentery into those causes caused by bacteria, those caused by ameba, and those caused by the *Balantidium coli*. Amebic dysentery has

been the subject of a certain amount of investigation, and, in some places, of control; that caused by the balantidium has received but scant attention,¹ and the bacillary forms are not reportable except in very few States. There can be no question about the advisability of making bacillary dysentery a reportable disease, and it should be studied with reference to its suppression just as energetically as any other of the communicable diseases.

Hunt² has made a study of some of the epidemics which have occurred in Pennsylvania since 1905, and the results of the investigations are very interesting. In some of the epidemics the water supply seemed to be at fault, although in some of the outbreaks there was no bacteriological analysis. In some epidemics, the water supply used by the affected individuals showed the presence of sewage organisms, and when typhoid fever is prevalent an outbreak of dysentery is usually followed by an increase in the number of typhoid fever cases, and usually by an increase in the number of deaths from typhoid fever. The lowering of the resistance of the body by mild attacks of dysentery evidently permits the typhoid bacillus to gain an entrance to the body in these instances. Various clinical types of the diseases are seen and various names are given to dysentery, such as winter cholera, intestinal grip, gastric fever, and the like. Various organisms have been found associated with dysentery, all more or less related, and Parke has suggested restricting the name dysentery to infections by the Shiga type, and paradysentery to all infections by other forms caused by the closely related organisms. From the public health standpoint, it would probably be better to make one clinical group of bacillary dysentery. A large number of the cases of summer diarrhea and bowel infections are probably due to bacterial infections, certainly in the warm parts of the United States. In institutions, flies have been found to be the carriers of the infection, and the suppression of the disease is to be undertaken along the same line as would be suggested for the control of typhoid fever. Indeed, the eradication of typhoid fever from the community would, in all probability, be followed either by an enormous fall in the number of cases of dysentery, or its complete eradication. I refer to this subject in the introduction to this article.

The Cultivation of Filarial Embryos. The cultivation of various organisms which, until recently, has been impossible, has led to some interesting experiments by Wellman and Johns.³ Following the success of Bass in the cultivation of the malarial parasite, an attempt was made to grow the embryos of the *Filaria immitis*, and they were able to obtain a number of positive cultures, using defibrinated dogs' blood which had been inactivated for long periods of time at comparatively

¹ See PROGRESSIVE MEDICINE, March, 1911, p. 124.

² Journal of the American Medical Association, September 21, 1912, p. 919.

³ Ibid., October 26, 1912, p. 153.

low temperatures. Various other mediums were used, such as hemaglobin-agar and bouillon, but these were not as successful as the defibrinated blood. The best results were obtained from this mixed with dextrose. The cultures were prepared by adding 0.1 c.c. of dogs' blood containing filaria embryos to 1 c.c. of dog serum containing 0.1 per cent. of dextrose. The parasites lived from twelve days to two weeks when placed in an ice chest at a temperature of 12° C., and during this time they increased in size from two to two and one-third times as long as when planted. Fresh serum, added about the eighth day, seems to aid the growth and vitality. The next best temperature, curiously enough, is as high as 40° C., but, if such cultures contain contaminating bacteria, the embryos of the filaria become rapidly overgrown and die, while at the low temperatures or even at a room temperature they seem to thrive in the presence of certain bacteria. Further investigation along this line may give us considerable more information concerning the evolution not only of these but of other similar organisms.

The Diagnosis of Glanders by Complement Fixation. Mohler and Eichhorn¹ have made an important report upon this subject which is a great advance in diagnostic work, particularly as it applies to veterinary medicine. Methods similar to the Widal reaction for typhoid fever were suggested as early as 1896, by McFadyean, but this method was not generally used until it was perfected by Schütz and Meissner, whose results were published in 1905. Precipitation reactions have been suggested by Pfeiler, and also by Kolew, and, in 1909, Schütz and Schubert published the results of their studies on the complement-fixation test. This test is so far superior to the other methods in use that it has been adopted as the official test in Germany. It is a hemolytic test similar to the Wassermann reaction for syphilis, and it is carried out on the principle suggested by Bordet and Gengou. This is not the place to enter into details which are fully outlined in the Bulletin referred to. This method is one which should be borne in mind by physicians as a means of clearing up doubtful cases.

The Hookworm Disease. Last year I called attention to the campaign against the hookworm being carried out under the general supervision of the Rockefeller Sanitary Commission for the Eradication of Hookworm Disease. This work has been carried on very effectively largely through the energy of Dr. C. W. Stiles, the scientific secretary of the Commission. The second annual report of the Commission deals with the progress of the work, and the results which have already been obtained are very satisfactory. This is perhaps the largest sanitary experiment ever carried on in any country, and the results of this method of fighting a transmissible disease will be watched by sanitary experts throughout the world with the greatest attention. The Com-

¹ Bureau of Animal Industry, Bulletin 136, 1911.

mission does not do the actual work, but acts as an educational body, furnishing information to the health authorities of various States and coöperating with them in every way possible. In each State, the work is directed toward three definite tasks; determining the distribution and degree of infection, getting the people treated, and removing the cause of infection by putting a stop to soil pollution. It is certain that the work of eradicating the hookworm will also cause a diminution in the incidence and death rates from other transmissible diseases, or what is known as the Mills-Reinke phenomenon, that reducing the rate for one disease reduces that for other diseases as well. The work of determining the distribution and the degree of infection is carried on, first by making a preliminary survey showing in what fields it is necessary to continue the work, and, so far, the disease has been demonstrated in practically all of the Southern States in which the investigation has been carried out. In the first survey, the disease was found in Virginia, North and South Carolina, Georgia, Alabama, Mississippi, Louisiana, Tennessee, Arkansas, and Kentucky. Since that time it has been found in Florida, California, Nevada, Oklahoma, and West Virginia, and there is very strong clinical evidence of its presence in Maryland. After the preliminary survey has been made, the degree of infection is next determined by taking up one county after another and making examinations of fecal specimens upon at least 200 children aged between six and eighteen years, and these children being taken at random, without any reference to clinical symptoms and from rural districts in different parts of the country. The record shows the number of children examined, the number found infected, and, the per cent. of infection, and this is taken as an index to the degree of infection among the children aged between six and eighteen years, living in the country districts in the given county.

The Commission has also undertaken to get information on the disease in foreign countries. The hookworm infection extends in a belt around the earth some 66 degrees wide, extending from about parallel 30 degrees north to parallel 30 degrees south. In Wales, Germany, the Netherlands, France, and Spain the infection is limited to mines or to a few definite localities. There are forty-six countries in which the disease is widespread, including eight in Africa, twenty-three in North and South America, thirteen in Asia, and the disease is rather widespread in Queensland, Australia, and also in Italy. The infected area known up to date, and this certainly does not include all, comprises an area of some fifteen million square miles in which there are some nine hundred and forty million people. The degree of infection varies greatly. The economic importance of the disease is very great, and it incapacitates the laborers in the various countries where it is found to a remarkable degree. The loss of time and money affects both the laborer and the employer.

The work of getting the people treated has progressed in a rather remarkable way. In the eight States in which the work is being carried out, there are 21,244 practising physicians, and, of these 4126 are reported as treating the disease. These physicians have treated during the last year over 53,000 persons. The effect of education is very remarkable. When the work was first started, the hookworm disease was scarcely known, and the announcement of its prevalence was not taken seriously. It was at first difficult to get people examined, and more difficult to get them to consent to treatment. Education by means of public lectures, bulletins, and folders by the public press, exhibits of State and county, efforts by examination of children in the schools, and students in the colleges, and the examinations made at State laboratories and by the celebration of a public health day have all been effective in bringing to the attention of the people the existence and means of combating this terrible scourge. The work has been carried on very systematically, and a great deal is now being done through county dispensaries. It was at first thought that people would not come to the dispensaries for examination and treatment, but this has been disapproved by the fact that they come in very large numbers, using all means of transportation and often coming many miles. In the United States, in 1910, there were 14,749 microscopic examinations made; in 1911, there were 90,724 microscopic examinations made. In the same area in 1910 there were 14,423 persons treated, while in 1911 140,379 were treated. In addition to the work of finding out where the hookworm infection exists and in treating people, there has been a systematic effort to make a sanitary survey based on privy conditions. A simple scale of grading is used, taking 100 as the best possible condition. The sanitary index of the county is expressed in figures which give some idea of actual conditions. The work has been completed in 129 counties in 9 different States, and some idea of soil pollution may be had by stating the fact that of 43,448 rural homes that had been inspected, 21,308 had no privies. Special efforts are being used to give instructions with a view to improving the sanitary conditions, stopping soil pollution, and to improving the county health service, and an effort will be made to have, in each county, a capable county superintendent of health devoting his whole time to public health work.

THE USE OF THYMOL IN HOOKWORM DISEASE. Stiles¹ has published a short note on the method of giving thymol in severe cases of hookworm disease. The treatment, as ordinarily advised, is so severe that patients are very much reduced in strength and the results are liable to be unsatisfactory. In these very severe cases, Stiles recommends that the preliminary salts be omitted, and that very small doses of thymol be used for one or more courses of treatment. This gives the

¹ Public Health Reports, December 8, 1911, p. 1925.

patient an opportunity to improve in general health, and subsequently if necessary, the usual treatment may be followed out. In several cases small doses of 10 grains of thymol have been used with remarkably beneficial results, and, in other cases, from 25 to 30 grains have been administered.

An Epidemic of Icterus. Weissenberg¹ has reviewed an interesting epidemic which occurred in Elisabethgrad, in South Russia. The epidemic consisted of 45 cases which lasted from July, 1909, to November, 1910, or a period of about seventeen months. It reached its greatest intensity in the months of October and November, 1909. The cases then decreased until the same time in the following year when there was an increase in a number of cases. The disease affected more women than men, and most of the cases were in adults. The cases were noted both in the city, which contained about 75,000 inhabitants, and also in the surrounding country. In most of the cases, after two or three days of headache, nausea, and loss of appetite, jaundice appeared and, at the same time, the lungs and spleen became somewhat enlarged and tender. In some cases the disease started suddenly with a chill and vomiting, icterus appearing within a few hours of the onset. The temperature was but slightly disturbed. The attack lasted about fourteen days, but there was a decided tendency to recur. Practically all the cases recovered.

Influenza. I have not noted any articles of special value concerning this disease.

Kala-azar and Leishmania Infections. There have been a large number of observations made upon this disease, and the Sleeping Sickness Bureau published several numbers of the *Kala-azar Bulletin*, which last fall was combined with the *Sleeping Sickness Bulletin*, and will henceforth be published as the *Tropical Diseases Bulletin*. This publication will deal chiefly with the diseases of the warm climates. A very good critical review of kala-azar and oriental sore has also been published by Leishman.²

Cardamatis³ has observed kala-azar in various places in the Greek Islands where it occurs only as a sporadic disease. It is probably one of the causes of enlarged spleen, but there are other diseases in Greece also accompanied by splenomegaly, the cause of which as yet remains unknown.

Gabbi⁴ has called attention to the presence of the organism of kala-azar in the exudate from the lesions in a case of ulcerative stomatitis. This brings up the question of studying cases of ulcerations for parasites,

¹ Deutsch. Medizinische Wochenschrift, August 12, 1912.

² Quarterly Journal of Medicine, October, 1912, vol. vi, p. 1099.

³ Bulletin Societé Path. exot., 1912, vol. v, p. 489.

⁴ Malaria e Mal. dei paesi caldi, March, 1912, vol. iii, No. 3, p. 78.

either the *Leishmania* or other varieties. Splendore¹ has also described in detail a special clinical form of Leishmaniosis which was localized in the mouth and nose. He gives the details from 3 cases which he observed in Brazil, and he is inclined to believe that the Brazilian bubo and the espundia of Peru are caused by organisms of this type. The histology of the lesion is similar to the changes found in Oriental sore. His opinion on this subject has been borne out by the observations of Escomel,² who studied this Peruvian disease. It begins with an ulcer on the skin, and subsequently affects the nose, mouth, and throat. A special form of *Leishmania* is found in the lesions. Various cases of ulcers similar to Oriental sore have been reported from other parts of South America.

Cochran³ has called attention to the existence of kala-azar in various parts of China, and suggests a method of diagnosis which he has found useful. This consists in the puncture of the swollen lymph nodes or, if desired, the excision of one of which is very easily accomplished, and from these lymph nodes smears are made. The diagnosis can often be settled in from five to twenty minutes.

Makkas and Papassotiriou⁴ have called attention to the fact that deviation of the complement may be obtained by using an aqueous extract of the spleen of children that have died from kala-azar. Their procedure is similar to that used in the Wassermann reaction. Experimentally, rats and mice, and white mice may be infected with the *Leishmania*, and Sargent, Lombard, and Quilichini⁵ have reported an instance of infections with the *Leishmania* which occurred in Algeria. The patient was a Spanish child, aged two years, who had always lived on a farm. On this farm there had been a sick dog which had been killed some time before, and another dog very much emaciated, showed the presence of the parasite, and the same is true of a young cat. This is the first instance of finding the parasite in the cat, and it is quite probable that the disease was transferred from the dog to the child by means of flea bites. There is some difference of opinion as to whether fleas are capable of transmitting the disease or not. Basile⁶ believes that they may transmit the disease, and there are other observers that agree with him. Gabbi,⁷ after making numerous experiments, was unable to transmit the disease by means of fleas, and 60 fleas captured in the morning on the clothing of an infant with a severe attack of kala-azar did not show any parasites. The whole question of transmitting the disease is one which needs further study.

¹ Bulletin Societe Path. exot., June, 1912, p. 411.

² Ibid., p. 489.

³ Journal of Tropical Medicine, January 1, 1912, p. 9.

⁴ Bulletin de l'Institut Pasteur, August 30, 1912, p. 727.

⁵ Bulletin Societe Path. exot., February, 1912, p. 93.

⁶ Policlinico, 1912.

⁷ Malaria e. Mal. dei paesi caldi, October, 1911, p. 285.

Patton¹ believes that he has observed a complete development of the *Leishmania donovania* in the body of fleas of two different species. He also observed the same thing in two species of Cimex; the *C. lectuarius* of Europe, and the *C. rotundatus* of India.

Makkas² has suggested the removal of the spleen as a therapeutic measure in infantile kala-azar, and reports one case which recovered under this treatment. The patient unfortunately died two months later of pneumonia, so that further observations were impossible.

INFANTILE KALA-AZAR. In PROGRESSIVE MEDICINE, March, 1910, I called attention to the subject of kala-azar as it occurs in infants. It would now seem that it is time to again mention this disease, as since that time it has been noted in a number of other countries, and it is quite probable that if some of our cases of anemia were studied from the point of view of there being a possibility of an infection with the *Leishmania infantum*, we may find the disease much more widespread than it has hitherto been believed. The disease begins insidiously, but, later, the symptoms are very characteristic, consisting of extreme pallor, emaciation, hypertrophy of the spleen, and somewhat slighter hypertrophy of the liver. There is transient edema, with pains, irregular temperature, rapid pulse, digestive disturbances, and a lymphocytosis. There is also great tendency to hemorrhage from the mucous membranes, and a purpuric eruption.

The disease was first described by Cathoire, in 1904, and it has been carefully studied by Nicolle, in 1909. The parasite is sometimes found in the peripheral blood, but not constantly, so that diagnosis may be extremely difficult. It may, however, be easily found by taking blood from the liver or spleen. Pittaluga³ has called attention to the fact that the disease is much more frequent than is ordinarily thought, and since its discovery it has been found along the northern coast of Africa, in Algeria, Tunis, and Egypt, in Greece and Italy, in Sicily, in Portugal, and now along the southern and east coast of Spain. In all the southern countries where it has been looked for it seems to have been discovered. The cases are usually mistaken for other diseases, particularly leukemia of the lymphatic type, and it has also been confused with anemia, with enlargement of the spleen, with Hodgkin's disease, and with one or two other diseases, such as chronic malaria where pallor and an enlarged spleen are the most prominent signs. It is extremely interesting and important to have the cases in our southern States presenting the above changes, studied with reference to the presence of this parasite.

Leprosy. There have been a large number of studies made upon the subject of rat leprosy, many of which were undertaken in the hope

¹ Kala-azar Bulletin, July, 1912, p. 124.

² Bulletin l'Institut Pasteur, August 30, 1912, p. 731.

³ Revista Ibero Americana de Cientias Medicas, October, 1912, p. 233.

of clearing up some of the obscure points in human leprosy. The disease was first noted in Odessa by Stefanski, and subsequently in various parts of the world by other observers. In America, in San Francisco, it was noted by Wherry and McCoy, in 1908, and the disease was considered from a public standpoint by Brinckerhoff in a publication issued by the Marine Hospital and Public Health Service. The disease resembles human leprosy in a superficial way from a clinical standpoint, and the bacillus which causes it is morphologically identical with the bacillus of human leprosy.

Zinsser and Carey have reported a series of experiments upon the cultivation of the bacillus of rat leprosy, which heretofore have been negative, and for the first year the work carried out by Terry, in collaboration with the above mentioned authors, was all unsuccessful. Hollman has been able to grow the organisms in connection with the growth of an ameba, and Zinsser and Carey were able to get successful cultures by using the technique such as is used for the growth of tissue cells, as suggested by Carrel, Harrison, and others. The organism was grown from the plasma cells derived from small pieces of the spleen of rats not over one week old. This method of study may prove of great value in the study of other organisms which have heretofore refused to grow under conditions furnished by the usual technique.

LEPROSY IN THE UNITED STATES. The presence of leprosy always excites a great deal of interest and, owing to the public being very much aroused whenever a leper is found, great hardship is often worked upon the unfortunate patient. Leprosy is not a reportable disease in all the States, but it seems probable that, when the diagnosis is made, the health authorities are usually notified.

In 1901, a total of 278 cases were located, and it was believed at that time that there were others which could not be found.

In January, 1912, there were a total of 146 cases in continental United States. Of these, 40 were new cases reported during the year 1911. These figures would seem to show that the disease, if anything, is on the decrease, although it is quite certain that many more cases than this are actually present in the United States.

THE CULTIVATION OF THE LEPROA BACILLUS. Duval and Wellman¹ have published another method of cultivating the lepra bacillus and, by the use of this method, both the acid-fast bacilli seen in human and in rat leprosy may be cultivated without much difficulty.

Duval had previously called attention to the fact that the first culture of lepra bacilli from the lesions is difficult, unless small pieces of the infected tissue are transferred to the culture medium and special methods employed for the breaking down of the tissue protein.

Clegg had employed mixtures of amebæ and the bacteria associated with them, and, subsequently, various amino-acids were added directly

¹ Journal of the American Medical Association, March, 11, 1912, p. 1427.

to the culture medium. The difficulty of obtaining a suitable medium, which could be prepared without too much difficulty, led to various researches, and, in 1911, Wellman suggested the use of the mammalian placental tissue extract as a suitable medium for cultivating the leprosy bacillus and allied species. The medium is prepared as follows: The fresh human placenta is thoroughly macerated and ground up in a meat chopper, after the blood is washed out by sterile saline run through the attached vessels. To every pound of placental tissue there is added 0.5 liter of sterile salt solution. This mixture is now allowed to infuse for forty-eight hours at refrigerator temperature, when it is filtered through a previously tested No. N Berkefeld filter for purposes of sterilization. To facilitate the filtration, the cylinder of the Berkefeld filter is filled with clean, fine, sterile sand until the candle is completely submerged. The clear amber-colored filtrate is then tubed or added to a 2 per cent. sterile agar which has been previously melted and cooled to about 41° C. The placental juice and the agar are then thoroughly mixed, and the mixture sloped. The addition of 3 per cent. glycerin possibly enhances its nutritive value.

With placental extract either in the form of a liquid medium or of glycerinated agar, the acid-fast bacilli in the removed and macerated tissue bits from human or rat leprosy multiply to such an extent that in from five to seven days the growth is distinctly visible to the naked eye.

THE BORDET AND GENGOU REACTION AND THE LEPROSY BACILLUS. Currie and Clegg¹ have carried on a series of experiments on this subject. They were unable to differentiate the leprosy bacillus from certain other acid-fast microorganisms. They also found that the extracts of certain other acid-fast bacilli will deflect the complement when combined with leprosy serum. They were able to produce specific agglutins for the leprosy bacillus by injecting a horse with the cultivated bacillus.

INOCULATION EXPERIMENTS IN LEPROSY. There has been considerable discussion as to whether leprosy could be transmitted from man to animals, and some interesting experiments have been made by Serra.² Leprosy bacilli were mixed with salt solution and inoculated into the veins of the ear, into the vitreous and anterior chamber of the eye, and under the ocular conjunctivæ of rabbits. The rabbits inoculated into the vein of the ear did not show any changes whatever, and, in some of the rabbits sacrificed a short time after the injection, the leprosy bacillus was found, but not later than thirty-two hours after inoculation. Inoculations into the anterior chamber of the eye made with bouillon cultures resulted in more or less inflammatory

¹ Public Health Bulletin of the Public Health and Marine Hospital Service of the United States, October, 1911, No. 50.

² *Lepra*, 1911, xii, 1; *La Semaine Medicale*, March 6, 1912, p. 110.

changes, and seven months later the bacilli could be demonstrated, and there was evidence of formation of leprous tissue. Inoculation made at the same place with agar cultures caused, after a considerable time, lepromatous nodules, containing typical bacilli. These were not tuberculous, and could not be transmitted to guinea-pigs.

STUDIES IN THE SPECIFIC THERAPY OF LEPROSY. There have been a great many different remedies suggested for leprosy and of recent years there have been many experiments made which, up to date, have not resulted in any very practical suggestions, although some of the work now being done promises much in the future. Among the more important suggestions is the use of tuberculin, and in the early observations the patients were usually made worse, probably owing to the dosage employed; in the more recent investigations, even though no untoward results have been observed, it is equally true that the patients have received little, if any, benefit. Potassium iodide and other iodine derivatives have also been extensively tried and the reports are rather variable, but, in the main, have not been satisfactory. It seems quite probable that some of the cases which have yielded very remarkable cures have been cases in which syphilis has been mistaken for leprosy. Various experiments have been made with sera, the first of which was by Carrasquilla. His serum was not one which, in the light of our present knowledge, could be even expected to give good results, yet it was very extensively tried and finally abandoned. Various other serums have been used without results. Currie, Clegg, and Hollmann¹ have published a review of this subject, together with the results of their experiments. Currie and his coworkers tried the serum from a horse which had received injections of leprosy bacilli. The periods of time over which they have used it have been rather too short to draw any definite conclusions, but from the fact that the animal serum strongly agglutinates the leprosy bacillus they are inclined to believe that by increasing the potency of the serum it may be made effective. Rattlesnake venom has been suggested, chiefly on account of a superstition that exists among the country people of Brazil that if a leper is bitten by a rattlesnake and does not die from the effects of the bite, he will recover from his leprosy. Carreau refers to a case reported by Dechambre, in which a leper was bitten by a poisonous snake and following his recovery from the snake bite his leprosy disappeared. De Moura claims to have caused the disappearance of some of the leprous lesions after the use of rattlesnake venom. Other investigations have not confirmed his observations.

I referred last year to the status of *Nastin* in the treatment of leprosy, and Currie and his coworkers have used a somewhat similar substance, consisting of an extract of the fatty material obtained from the leprosy bacillus. Up to the present time they have not determined its value

¹ Public Health Bulletin, September, 1911, No. 47.

in the treatment. Various forms of vaccines have been used by a great number of different observers; those obtained from streptococci and the *Bacillus prodigiosus* have been the most widely used, but no favorable results have been obtained. Currie, Clegg, and Hollmann have carried on a series of experiments with various forms of vaccines, and those made from killed cultures of the leprosy bacillus could not be employed to advantage unless very small doses are used, owing to the slow absorption of the material and its tendency to cause abscesses. They have also used very small doses of live cultures and they believe that this method is deserving of further trial, although there is some danger of producing abscesses if the dose is too large. Toxines prepared from the leprosy bacillus, after the method of Koch's old tuberculin, appear to have little or no value in the treatment of leprosy.

Malaria. MALARIA WITH CEREBELLAR SYMPTOMS. Pozilli¹ has reported an interesting case of malaria presenting unusual difficulties in the diagnosis apart from the examination of the blood and has called attention to the fact that there has been some fourteen cases with similar symptoms reported in the literature. The case was one of a child, aged four years, who so far as was known had never had malaria before and who was taken about six weeks before it entered the hospital with the tertian type. Three or four days before applying for treatment the child had difficulty in walking, and the case was sent to the hospital as one of acute polioencephalitis. There was marked disturbance of the equilibrium both on standing and in walking. When the child walked there was tendency to fall either forward or to the side. There was scanning speech, an intense grade of anemia, and an apathetic expression. The spleen extended two fingers' breadth below the costal margin. Sensation was normal. The tendon reflexes were exaggerated, the pupil reaction sluggish, and there was slight nystagmus and an intentional tremor. 'Babinski's sign was absent. There were no trophic disturbances. An examination of the blood showed the estivo-autumnal parasites with some crescentic forms. The child was placed upon quinine, and the parasites disappeared from the blood in about a week and the symptoms disappeared rapidly, so that in less than a month the child was perfectly cured. The article goes on to discuss at some length the symptoms and the pathology of the disease, the chief interest of which perhaps is in the diagnosis.

MALARIA IN INFANCY. Fusco² has made a rather extensive study of this subject and calls attention to a very important thing which, while it has been noted before, has not been sufficiently emphasized, and that is in malarial regions malaria is quite commonly found in infants under one year of age, and the symptoms are very misleading. In many cases the fever is of short duration, and there is usually no

¹ Il Policlinico, July 7, 1912, p. 12.

² Il Policlinico, Sezione Pratica, February 18, 1912, p. 261.

chill; this latter is replaced usually by a convulsion or vomiting, or both together. In other cases, there is merely a vasomotor disturbance, usually pallor or cyanosis of the skin, and sometimes this may be limited to some one special area. In some instances, the fever may be high, or prolonged for six to seven hours. The spleen is almost invariably enlarged, and any irregular diseases in infancy accompanied by an enlarged spleen should lead to careful examination of the blood for the malarial parasite. Most observers have found that the tertian form is most common in infancy, but Fusco found that 85 of his cases were infected with the estivo-autumnal form and only 21 with the tertian. This perhaps differs in different regions and at different times of the year. In regard to congenital malaria, he believes that this has not been true beyond question of doubt, but thinks it true that children born of mothers suffering from malaria are much more liable to infection than other children.

THE PROPHYLAXIS OF MALARIA. There have been a great many publications on this subject, two of which contain material of considerable interest to which only brief mention can be made at this time. These publications are the report of the Italian Society¹ for the study of malaria, and the transactions of the committee for the Study of Malaria in India, the fourth number of which, in 1912, is devoted to the Transactions of the Second Congress of the general committee on malaria held at Bombay, in November, 1911, under the presidency of a certain Surgeon General, C. P. Lukis. There are various large areas in the world in which the anopheles mosquito abound and in which malaria is a very serious problem. Many of these areas have existed from very ancient times. As is well known, the decadence of ancient Greece is supposed to have been largely due to the prevalence of malaria, and an interesting theory has been advanced that this was due to the introduction of soap. Prior to the use of soap, the entire body was anointed with oils of various kinds which probably acted as a protection against the mosquito, as it is known that they will not bite even through the thinnest film of any oily substance. The question of combating malaria has been the object of considerable study. One method is to get rid of mosquitoes by drainage and the use of petroleum, and Koch suggested the treatment of all persons in infected districts with quinine. Timpino has tried this method in parts of Calabria. His experience is that, while it affects the individuals who take the quinine, it does not essentially change the gravity of the situation. The Italian Government has done much, by furnishing quinine, both in reducing the number of cases and reducing the number of deaths. There are about 3500 deaths a year in Italy from the disease, and this has remained stationary for the last four years. In 1901, there were nearly 16,000 deaths, which shows what the systematic

¹ *Atta della Societa per gli Studi della Malaria*, Rome, 1911, vol. xii.

use of quinine has done. In 1910, nearly 23,000 kilos of quinine was distributed by the state.

The Indian Committee find the use of quinine of great value in India, both in lessening the incidence of the disease and the numbers of deaths, as well as the prevention of the disease and the destruction of the reservoir of virus, but they do not believe that this means alone will be successful, and they urge a systematic campaign against malaria in which the coöperation of the population is one of the great factors of success. Indeed, the education of the public in malarial districts to the way the disease is spread, the necessity for cultivating the land, of draining swamps, and the use of petroleum and of the obliteration of pools of water should be impressed upon all, particularly on the growing population, and, for this reason, making the prevention of malaria part of the school course is to be highly recommended. Any one interested in the practical side of preventing malaria should read Carter's article on antimalarial measures for farmhouses and plantations.¹

THE CULTIVATION OF MALARIAL PLASMODIA IN VITRO. The question of the cultivation of the malarial parasite has been the subject of considerable study and of a great amount of interest. In 1891, Coronado claimed to have cultivated the plasmodia from infected water, but this was evidently an error, as all non-isotonic fluids are destructive to the parasites. In 1893, Laveran reported that malarial parasites were visible in hanging-drop preparations for as long as ten days, but he was not sure that the parasites remained alive, nor that any multiplication took place. Miller has reported that he has cultivated the parasite, but the results of his experiments have not been confirmed. The malarial plasmodia has been kept alive for several days in leeches that have been allowed to suck blood from malarial parasites but the evidence that these parasites developed is not complete.

Bass and Johns² have reported in detail their successful experiments in growing the *Plasmodium vivax* and the *Plasmodium falciparum*. The tertian parasite was cultivated six times, estivo-autumnal twenty-nine times, and one quartan was tested but failed to grow. Bass,³ however, in 1911, reported one instance of successful growth of the quartan parasite.

The technique, which they believe will be simplified by further study, consists of drawing a large syringe of blood from the patient, choosing usually the basilar vein. This blood is immediately placed into a tube about 1 inch in diameter and as long as the centrifuge will accommodate, and in this tube there should be placed $\frac{1}{10}$ cm. of a 50 per cent. solution of dextrose for each 10 c.c. of blood. The

¹ Public Health Bulletin, December 6, 1912, p. 2024.

² Journal of Experimental Medicine, October, 1912, p. 567.

³ Journal of the American Medical Association, November, 1911, vol. lxii, p. 1534.

tube is plugged with cotton through which a glass tube or rod is run. The blood is defibrinated, by gently stirring with the rod, care being taken to avoid mixing the blood with air. The defibrinated blood may be transferred to other tubes or be incubated in the original tube, but the column of blood must be from 1 to 2 inches deep. This gives a column of serum $\frac{1}{2}$ to 1 inch deep above the parasites when the solid matter is settled. There is no advantage in having this supernatant serum more than 1 inch deep, but it must not be less than $\frac{1}{2}$ inch deep, as otherwise the parasites often die before segmentation occurs. The parasites live and develop at the top of the column of precipitate in a layer varying in thickness from $\frac{1}{30}$ to $\frac{1}{20}$ of an inch. Those beneath this layer die within twenty hours. The parasites in the thin layer at the top of the column of cells may be examined by drawing a small quantity of cells from this layer by means of a capillary pipette. This requires considerable practice. If more than one generation of plasmodia is to be cultivated, the leukocytes must be removed when the culture is made, to avoid the destruction of the parasites at the time of segmentation. To do this, the blood is centrifugalized sufficiently long to force the leukocytes to the surface of the cells, and a certain amount of experience with any particular centrifuge will be necessary to determine just how long this is necessary. The serum is then drawn off and put in culture tubes, and the cells and plasmodia are carefully drawn from about the middle of the cells which remain in the centrifugalized tube. Flat bottom tubes are an advantage.

In successful cultures, the asexual parasites grow and segment, and form rosettes which burst and give rise to merozoites, many of which enter other red blood cells just as they do in the body of man. The estivo-autumnal parasites are more resistant to unfavorable conditions in cultures than are the tertian. The sexual forms of parasites have not been grown, although, in one instance, observations were made which seemed to point to the possibility of the cultivation of these forms. Serum from different individuals is not equally serviceable for the cultivation of the parasite. The authors quoted were unable to grow the parasites, except in the presence of red blood cells, and the parasites did not seem to be able to live but a few minutes in the free serum. If the leukocytes are left in the culture, they migrate toward the surface and become concentrated in the layer in which the parasites grow. They do not attack the parasites as long as they are inside the red blood cells, but, as soon as the merozoites are liberated, they are promptly taken up so that leukocytes may then be found full of them. The most rapid growth is obtained in a temperature of 40° to 41° C. The estivo-autumnal parasites will develop from the smallest rings and segment in about thirty hours at a temperature of 41° C., while they require forty-eight hours in the body of man. Para-

sites will usually develop, but more slowly, at any temperature between 37° and 40° C., and one culture of tertian parasites segmented in four days at a room temperature in May in the laboratory at Ancon. It is very probable that other protozoal parasites which entered the red blood cells may be cultivated by using a somewhat similar technique. From their observations, the authors believe that, in the body, the parasites can pass from cell to cell only when the cell is in direct contact with another containing a segmenting parasite and then only when the opening for the exit of the merozoites occurs opposite the cell to be infected. The substance of the malarial plasmodia is less yielding than that with the red blood cell, and the cells containing the parasites are unable to pass through the smallest capillaries, so that they lodge where the blood current is weak and develop until they segment. Other blood cells being forced against these may lead to one cell being directly infected from the other. As soon as the parasite segments, it passes into the circulation where the remaining merozoites are almost instantly destroyed.

When calcium salts are added to cultures of the estivo-autumnal plasmodia, it causes hemolysis of the infected red blood cells, possibly also many of the non-infected cells. The calcium salts do not have the same effect on normal blood. The authors suggested that, as the amount of calcium necessary to induce hemolysis is only slightly above that normally present in the blood, calcium in the drinking water or food may lead to hemolysis, and that this may explain the malarial hemoglobinuria and may also clear up the reason for the disappearance of hemoglobinuria independently of the disappearance of malaria from localities in which a change from surface lime-containing water to a deep lime-free water supply has been effected. They also suggest that quinine has no destructive effect upon the parasite, but that it probably renders the red blood cell more permeable to the destructive influence of the serum. Thus, quinine would affect only the parasites in the circulation and not those lodged in the capillaries. They suggest that the effects of quinine may be defeated by the influence of diet, exertion, etc., which increases the dextrose content of the blood which lessens the permeability of the red blood cells.

These studies of Bass and Johns are of unusual interest, and further investigations will doubtless throw much light on many of the curious phases of malaria and explain many points which are now shrouded in mystery; why quinine is not always effective, and why the disease may apparently lie dormant to be aroused into activity by change of climate or by some other disease, and the question of hemoglobinuria, and numerous other similar things.

The Diagnosis of Malta Fever. Mohler and Eichhorn¹ have had their attention directed to the diverse opinions among the investigators

¹ Journal of the American Medical Association, April 13, 1912, p. 1107.

of Malta fever, relative to the value of the agglutination reaction in the diagnosis of the disease and have carried on some studies which were exceedingly interesting. Some investigators believe that an agglutination of 1 to 10 is sufficient proof of the presence of the disease; others claim 1 to 20, and still others 1 to 30. The study of the blood of goats showed that serum from healthy goats, born and raised at the experiment station, gave an agglutination value of from 1 to 40. In goats, they consider that a value of from 1 to 70, in a time limit of one and a half hours, is necessary for a positive diagnosis, while Kolle and Hetsch believe that, in goats, it should be at least 1 to 100.

Mohler and Eichhorn made a series of studies on the value of the complement fixation test. The agglutination tests made were both microscopic and macroscopic, the best results being obtained by the macroscopic method, using a procedure similar to that practised for the diagnosis of glanders. The test fluid is made from a four-day-old glycerin-agar culture of the *Micrococcus melitensis*, by heating the culture at 60° C. for one and one-half hours, and then washing with phenolized salt solution, filtering and diluting to the desired density. The suspected serum is diluted with phenolized salt solution in a proportion of 1 to 4, and the tests were made from this dilution, adding the required quantity to 2 c.c. of the emulsion of the bacilli. Any number of different dilutions may easily be made; the rack containing the test tubes is then placed in the incubator for one-half hour; afterward the tubes are removed and centrifugalized for ten minutes, at 1600 revolutions per minute. The tubes are then returned to the rack without further incubation and the results read after one or two hours. In the positive tubes, there is an irregular veil-like clumping of the sediment over the bottom of the tube, with a clearing of the upper part of the fluid. They consider that this method would be extremely useful in testing large numbers of goats. The results obtained by the microscopic agglutination tests were similar, but required much more time in the manipulations.

The hemolytic tests were made by using sensitized rabbit serum, the serum from a guinea-pig, and a 5 per cent. suspension of washed sheep corpuscles. An antigen was prepared from a four-day-old glycerin-agar culture. They used a dilution of from 1 to 50, and the goat serum to be tested was heated to 56° C. for thirty minutes. Serums from the goats at the experiment farm were all negative; 4 serums from suspected goats sent from Texas gave a positive reaction, while 16 others from the same source were negative.

They believe that the complement fixation test will be found to be the most satisfactory method of making the diagnosis of Malta fever. They expect to continue their studies, extending them to human beings.

Measles. EXPERIMENTAL MEASLES IN THE MONKEY. Last year I noted the experiments of Anderson and Goldberger concerning the

production of measles in monkeys, and since then there have been several publications on this subject of considerable interest and all agreeing with the observations previously mentioned.

Lucas and Prizer¹ have given a resumé of this subject and detailed their own experiments, which are of particular interest. We may omit the particulars, but, on a very sound experiment basis, they have decided that they can produce measles in the *Macacus rhesus* in which they agree perfectly with the work of Anderson, and Goldberger, of Hektoen and Eggers, and of Nicolle and Conseil. The disease, as produced, has a definite incubation period and they noted, beside the fever, conjunctivitis, rhinitis, and the skin eruptions, the presence of Koplik spots to which I believe they are the first to call attention in the monkey. The measles virus is present in the blood serum. It is sometimes present twenty-four hours or more before the appearance of Koplik spots, and persists until more than thirty-six hours after the appearance of the skin eruption. There is a typical blood picture, at least in the preëruptive stage, in which there is a leukopenia developing in from five to ten days after inoculation, and it may be preceded by a transient lymphocyte and large mononuclear leukocytosis. The leukopenia involves the polymorphonuclear neutrophiles, the lymphocytes, and the large mononuclear leukocytes.

Nicolle and Conseil² have reported before the French Academy of Sciences the results of their experiments, which consisted in the inoculation of a *Macacus sinicus* with 6 c.c. of blood from a child, aged nine years, who presented the usual beginning signs of measles before the appearance of the eruption. A brother of this child was in the fifteenth day of a typical attack of measles, and two others of the same family showed the same symptoms as the subject of the experiment. All three of these children showed a typical eruption twenty-four hours later. The monkey, which was inoculated in the peritoneal cavity, did not show any symptoms until the ninth day. Then there was temperature and indisposition which increased for the next three days and lasted six days in all. They concluded from this that measles is contagious before the eruption, that is to say at a period when it is usually not recognized. They unfortunately did not state whether Koplik's spots were present or not.

Hektoen and Eggers³ have repeated the experiments of Anderson and Goldberger, which were noted in last year's *PROGRESSIVE MEDICINE*, and a special study was made of the leukocytes. In a general way, their experiments agreed with those of Anderson and Goldberger, and they show that the *Macacus rhesus* is susceptible to a mild form of measles if injected with the virus of human measles present in the

¹ *Journal of Medical Research*, April, 1912, p. 181.

² *La Semaine Médicale*, January 3, 1912, p. 11.

³ *Journal of the American Medical Association*, December 2, 1911, p. 1833.

blood soon after the rash has appeared. The leukocytes undergo changes very similar to those in human measles—that is, there is a more or less distinct leukocytosis, followed by a variable degree of leukopenia, which corresponds, in a general way, to the latter part of the preëruptive and the early part of the eruptive periods.

In a second publication, Anderson and Goldberger¹ have detailed some further experiments, and it would seem that the period of infectivity of the blood begins at least twenty-four hours before the first appearance of the rash on the skin and continues for about twenty-four hours after the rash is first noted. After this, the infectivity of the blood for the Rhesus monkey appears to be greatly lessened and grows progressively less thereafter. The reaction in the monkey consists, first, of a rise of temperature, especially in the morning, with a sustained or higher reading in the afternoon. The temperature may remain about the same level for four or five days, and then drop rather sharply and remains down, unless there is a complicating bronchitis or pneumonia. On about the third day after the rise in temperature begins, there is an eruption, but this may be delayed for one or two days longer. The eruption is noticeable on the chest or abdomen, and may spread to the thighs, arms, or face. On other parts of the body, the thick fur prevents its being plainly seen. There is a fine, branny desquamation and more or less variation of the eruption just as in human beings. There is frequently coryza and coughing. Koplik spots have been observed by Lucas and Prizer, as noted above. The monkey that has had a definite reaction is found to be immune to a subsequent inoculation with virulent blood. The virus in measles blood is capable of passing through a Berkefeld filter. It may resist drying for three and a half hours, and it resists freezing for twenty-five hours, but is destroyed by heat at 55° C. for fifteen minutes. The secretions from the mouth and nose may be found to be infective for the monkey in all cases where the secretions are collected within twenty-four to forty-eight hours after the appearance of the eruption. They are inclined to believe that with the approach of convalescence, there is a marked reduction, if not a total loss of infectivity of the nasal and mouth secretions. The scales from measles cases do not seem to be infective at all.

KOPLIK SPOTS. Ever since Koplik first described the spots which bear his name, and which are regarded as pathognomonic of measles, there has been considerable discussion as to whether they are ever found in any other disease or not. The chief observations concerning other diseases date from 1899 when Widowitz² found them in 10 cases out of 126 patients suffering with German measles. Muir³ thought that

¹ American Journal of Diseases of Children, July, 1912, p. 20.

² Wiener klinische Wochenschrift, 1899.

³ Lancet, 1904.

he observed them in diphtheria, and Challazzi¹ reports finding them in a case of whooping cough and also in a case of acute staphylococcus tonsillitis. Miller² found the spots in a case of German measles in a girl who previously had measles, and Weill and Gardère found them in 3 cases of mumps, and in one case of chicken-pox. One is inclined to believe that these observations are more or less incorrect, and probably inflammatory conditions simulating Koplik spots were mistaken for them. Unless one bears in mind the exact appearance, and makes the observations by means of a white light, mistakes are very liable to occur. From a fairly large clinical material studied with particular reference to Koplik spots, I have never seen anything which, if examined under proper conditions, could be mistaken for them and I have never found spots in anything except measles. In hasty examinations, or in examinations made with a poor light, one frequently sees small spots, which, unless proper care is taken, will almost certainly be mistaken for Koplik spots.

MEASLES AND SALVARSAN. Marfan and Legane³ had under their care a child, aged seven years, which had been treated for a pseudo-paralytic syphilis since it was six weeks of age. This had disappeared under mercurial inunctions, but at the time the patient entered the hospital, it had three syphilitic gumma and the Wassermann reaction was positive. The child was given two injections of salvarsan, one on March 2 and one on March 15, and on March 18 the patient developed measles which ran its course uninfluenced by the injection of the drug.

SCHOOL CLOSURE IN MEASLES. The question of the closing of schools in the control of measles epidemic is one in which there have been considerable differences of opinion, and some interesting statistics have been published by Raffle.⁴ These statistics are of such interest that I have reproduced Raffle's table.

In this epidemic 4470 children were exposed to infection; of these 2180 were susceptible to the disease; of these, 853 were infected, 638 cases occurring during the time that the children were at school and 140 during the period of fourteen days after which the school was closed—that is, 778 cases which might have been infected either at school or in home life. Thus, at the time the schools were closed, there were still more than 1400 children who were susceptible to measles, but only 75 of these children actually contracted the disease. These figures show quite conclusively the enormous value of closing the schools in combating epidemics of measles.

¹ *Gazetta degli Ospedali*, 1904.

² *Münchener medizinische Wochenschrift*, 1905.

³ *La Semaine Médicale*, April 10, 1912, p. 180.

⁴ *Lancet*, February 3, 1912.

TABLE SHOWING THE INFLUENCE OF SCHOOL CLOSURE IN AN EPIDEMIC OF MEASLES

Name of school.	Extent of closure.	Average attendance.	Number of susceptible children.	Number of cases before closure.	Number of cases within 14 days after.	Number of cases more than 14 days after.
Westoe . .	All	480	240	77	27	17
Ocean Road .	All	380	190	51	16	7
St. Hilda's .	All	170	80	19	1	2
St. Stephen's .	All	175	80	18	0	5
Gilbert Street	All	400	200	71	28	20
Barnes . .	All	440	210	37	8	0
Baring Street .	All	450	220	49	16	1
Mortimer Road	All	520	250	76	18	3
W. Harton .	All	200	100	28	6	1
Cone Street .	All	310	150	22	1	8
H. Trinity .	All	345	170	51	10	6
Laygate Lane	Classes 5, 7, and 8	150	70	21	0	2
St. Bede's . .	Classes 6 and 7	100	40	28	1	2
Stanhope Road	Class N 2	50	20	22	0	0
Mowbray . .	Classes 7, 8, 9, 9A, and 10	300	160	48	8	1
Total		4470	2180	618	140	75

Mumps. THE ORCHITIS OF MUMPS TREATED BY OPERATION. Geo. G. Smith¹ has presented a preliminary report of more than usual interest, as it deals with an entirely new method of treating the orchitis due to mumps, with the object of preventing the atrophy which so frequently follows. Orchitis in young adults is likely to occur once in every three cases of mumps. It appears in from two to ten days after the beginning of the orchitis, usually between four and eight days after. In 43 cases, Catrin found 13 bilateral, 18 on the right side and 12 on the left. With ordinary methods of treatment, consisting of rest in bed and various applications, atrophy of the testicle occurs in about 60 per cent. of the cases affected.

The operation was suggested by Dr. Hugh Cabot. He based his idea upon the theory that the atrophy results from the increased intratesticular pressure caused by the inflammation. He thought that if this tension was relieved, by slitting the tunica albuginea, the circulation would be restored and the testicle preserved. Smith operated upon 2 cases, one aged twenty-two years and one aged twenty-seven years. One case may be cited as an example. The parotid began to swell July 1. Nine days later there was swelling of the left testicle. On July 13 the patient was operated upon. There was considerable hydrocele, and marked involvement of the epididymis. The operation consisted of a two-inch vertical incision along the anterior aspect of the left side of the scrotum, and then the tunica vaginalis

¹ Boston Medical and Surgical Journal, September 5, 1912.

was opened, allowing about an ounce of turbid yellow fluid to escape. The testicle was three times its normal size, and there were numerous, small, punctate hemorrhages. The epididymis was very dark red and intensely congested. About a dozen small parallel incisions, $\frac{1}{4}$ inch long, were made parallel to the long axis of the testicle and extending just through the tunica. The tunica covering the epididymis was opened in about six places. A rubber drain was inserted, and the scrotum tightly compressed in an Alexander bandage. The drain was removed three days later, and the patient left the hospital two days after that. At this time the testes were of the same size. The fluid removed at the time of operation was negative for bacteria of all kinds, as was a small piece of testicular tissue which was removed for examination. The pathological process does not affect the tissue uniformly. Some of the tubules are completely destroyed and distended with exudate, while other areas are but slightly affected. The inflammatory process affects the connective tissue between the tubes, having the characteristics of an ordinary inflammation.

BRADYCARDIA IN THE COURSE OF MUMPS. Tiessier¹ has called attention to the disturbances of cardiac rhythm which he has observed in the course of mumps, the most frequent of which is bradycardia. This is of moderate degree, varying between 40 and 50 pulsations to the minute; it generally begins early and, curiously enough, is most marked in the apyretic forms. It is usually persistent, but may disappear spontaneously at any time. The exact cause of this bradycardia is rather obscure, and it is usually not attended by any bad effects.

INVOLVEMENT OF THE PANCREAS IN MUMPS. Last year I called attention to the observations of Cuche, and others, concerning involvement of the pancreas in the course of mumps. Since then, Freund² has contributed a study of the urine, studied from a standpoint of the sugar content, and all the cases which he examined were negative. Cheinisse³ has gathered together the facts and references concerning this condition.

Intestinal Myiasis. I have called attention several times to this condition, and recently Cockayne⁴ has reported a case of unusual interest, and has also selected some important references from the literature. His case was in a baby, aged one year and two months. The larvæ were found under the mackintosh or flannel upon which the baby had been lying during the night, and were often seen in large numbers, as many as 50. None of these were ever found in the napkins, and the stools were free from them. The child was not particularly robust, but was in his accustomed state of health, with no untoward

¹ La Semaine Médicale, January 17, 1912, p. 32.

² Wiener medizinische Wochenschrift, December, 1911.

³ La Semaine Médicale, February 21, 1912, p. 85.

⁴ Lancet, January 20, 1912, p. 155.

symptoms. The larvæ were those of the common house fly, and one that was found was from the small house fly. They were in the last nistar and were probably full grown, and had evidently left the child voluntarily. Cockayne found 10 other cases in the literature, in 3 of which the larvæ were vomited. In one of these, there was a fatal outcome. As a rule, the larvæ caused no symptoms, or only slight changes. In many cases there was only a slight loss of appetite and a little nausea, and sometimes colicky pain, with either constipation or diarrhea. In the more severe cases, vomiting is noted, and hematemesis has been reported once. There may be also diarrhea of a dysenteric character, and blood may be passed. Nervous symptoms, chiefly headache and convulsions of an epileptic form have also been reported; these usually cease with the expulsion of the parasites. It is not quite clear how the larvæ gain access to the intestinal tract, but it is supposed the ova are laid on dressed meat, cheese, and various vegetables, or, in some species, the ova may be taken in dirty water.

The Curative Value of Leishmania Culture "Vaccine" in Oriental Sore. Row¹ has suggested the use of vaccine in the treatment of Oriental sore. It was difficult to get the people with whom he came in contact to submit to curetting of the lesions and applications of powdered potassium permanganate, or to get them to submit to injections of of arsenobenzol. It was found that the sores will heal eventually if they are treated with applications of 1 dram of salol, dissolved in 1 ounce of olive oil, but this takes two or three months, during which time the sore must be carefully attended to daily. The vaccines which he used were made from cultures grown on the Nicolle-Novy-McNeal medium, and are used on the seventh day, after having been sterilized with glycerin. There was little, or no, constitutional disturbance, and the only local effect was slight itching in the sore on the second day. The healing, in the small series of cases, has been uninterrupted, and has taken an average of about two weeks.

Appendicitis Due to Oxyuris and Trichocephalus. Cecil and Bulkley² have published an account of this subject. They have also previously published articles in the *Medical Record*, 1910 and 1911, and in the *Journal of Experimental Medicine*, 1912. Their previous contributions dealt with the clinical picture and the pathology of the disease. In the present paper, they have considered the literature of the subject as well. The first reports in which the oxyuris or trichocephalus was found in the appendix were published in 1900 when Beyea and Frazier reported cases of oxyuris, and Guinard reported cases of trichocephalus. Still, in 1899, found the oxyuris in the appendices in children from autopsies, and two years later Metchnikoff reported 3 cases of appendicitis due to the *Ascaris lumbricoides*. This last paper stirred up

¹ British Medical Journal, March 9, 1912, p. 540.

² American Journal of the Medical Sciences, June, 1912, p. 793.

considerable interest on the subject of parasitic appendicitis, and there were almost immediately a number of cases reported.

The figures concerning the frequency of these parasites varies greatly. In 800 autopsies, Brumpt found the oxyuris in 3.5 per cent. In 1300 autopsies on children, he found the parasites in the appendix twice, or 15 per cent. Broca, in cases operated upon, found the parasite in 40 per cent., and even higher percentages have been reported. In Germany, Hoepfl found the oxyuris in 24 out of 117 cases operated on, or 21 per cent., and Delsmidt examined the stools of 21 children who had appendicitis and in 18 of them found eggs of either trichocephalus or ascaris. In 200 autopsies on children under twelve years of age, Still found the oxyuris in the intestines in 19 per cent. of the cases but in only 6 cases were they found in the appendix.

In this country, there have been comparatively few reports. Crile, in 1000 cases of appendicitis with observations on the etiology, failed to mention worms of any sort. Deaver found the oxyuris once in 500 appendectomies in children. Kelly, in 400 cases of appendicitis, did not mention worms as the possible cause, and Erdman found pinworms in 4 out of 280 appendectomies in children. Schloss, in New York, examined the stools of 280 consecutive children and found the trichocephalus in 11.07 per cent., and the oxyuris in 8.21 per cent. Cecil and Bulkley studied 148 unselected appendices of children between two and fifteen years of age, 129 specimens were from operations and 19 from autopsies. Of the clinical cases, 19, or 15 per cent., contained one or either parasite. Eighty-nine of the series were either the gangrenous or suppurative type of appendicitis, and in these parasites were found only four times. In the non-suppurative cases, parasites were found fifteen times, or about 38 per cent. They also found 4 adult appendices containing the oxyuris. They were able to collect from the literature 49 definite case reports of appendicitis associated with oxyuris or trichocephalus, and they have 23 cases of their own, making a total of 72. A little over 50 per cent. occurred between the ages of six and fifteen years. In the cases in which the sex was stated, they occurred twice as frequently in males as in females. The youngest case occurred in a child, aged twenty-one months, and the oldest in a woman, aged fifty-four years. The disease occurs both in the city and country, and is not limited to the poorer classes. The oxyuris is by far the most common parasite found in the appendix. Eighty-four per cent. of the cases reported contained it, and only 13 per cent. showed the trichocephalus, and in one case both parasites were found. There has been considerable discussion as to whether the mere presence of parasites can cause appendicitis, or whether they act merely as foreign bodies which injure the mucous membrane of the appendix and so permit bacteria to enter and cause further trouble. Cecil and Bulkley believe that the parasites alone are capable, in some instances, of causing the symptoms of appen-

dicitis. The parasites may penetrate the mucous membrane, and, when they do, they do not cause any inflammatory reaction and there is no infiltration of leukocytes about the worm.

The lesions in the appendices containing the parasites were of the catarrhal or non-suppurative type in 86 per cent. of the cases. The sections showed no inflammatory changes and, with the exception of the presence of the parasite and the swelling of the centres of the lymph follicles, there were no apparent changes. The symptoms are characterized by exaggeration of the subjective symptoms and the lack of objective signs. The pain is described as gnawing, or scratching in character, with itching sensations in the right lower quadrant of the abdomen. In addition, there are usually attacks of severe pain, first localized, and then general, as seen in other forms of appendicitis. Rigidity is frequently absent and is almost always less than would be expected from the acute degree of tenderness present. In some instances, the parasites or their ova may be administered in the feces. The ideal treatment is to remove the appendix, but, in cases of indefinite symptoms, it would seem logical to try the effect of medicinal treatment.

Pappataci Fever. Last year I noted the occurrence of pappataci fever in certain researches concerning its spread by the species of gnat, *Phlebotomus papatasi*. Various other reports have been made since, which show this fever is a widespread one, and has been noted in many different sections of the country in which observations have been made on it. Francaviglia¹ has noted the disease in Catania, and also in eastern Sicily. The disease was noted in Italy as early as 1888 by the military physicians who gave it the name of *summer fever*, and since that time it appears that the disease has been studied under various names, as the *fever of Pym*, *simple continued fever*, *dog fever*, *hemp fever*, and *three-day fever*. Numerous theories concerning its causation have been advanced and the most recent one, its transmission by the gnat, is the most important one. It is of comparatively little importance except from an economic standpoint, but it is very important when considered from that point of view, as it is liable to incapacitate large numbers of individuals for a number of days at a time, and is particularly liable to interfere seriously with movements of armies. The disease has been noted throughout various places in Europe, in some of the Mediterranean islands, in the Argentine Republic, and in India. As far as I know, no observations have been made of it in North America, although it is quite probable it does exist and is confounded with paratyphoid, typhoid, and malaria.

Parameningococcus Septicemia Treated with Methylene Blue. Suria² has reported a case of a child, aged seven years, whose illness commenced with catarrhal symptoms affecting the nose, larynx, and bronchi, and

¹ Il Policlinico, Sezione Medica, March, 1912, p. 132.

² La Clinica Moderna, July 1, 1912, p. 389.

in whom general symptoms soon after developed. The blood cultures showed the presence of bacteria which were classified as a form of parameningococcus. Two weeks after the beginning of the disease, during which there had been no improvement, the child was given methylene blue in doses of 0.05 gram. This caused nausea and vomiting, and double the quantity was given every three hours by rectum. This was well borne, and in six days the temperature had become normal and the child was considered convalescent.

The Simulum and Pellagra. Hunter¹ has made a study of the cases of pellagra in Kansas, and found that the only species of simulum in Kansas is the *S. vittatum*. All the cases of pellagra which they were able to find in Kansas occurred in the sand-fly territory, with one exception—that of a man who had spent one year in the South. Hunter carried on a series of experiments, using live sand flies which were exposed to a case of pellagra and then allowed to bite both guinea-pigs and monkeys. In the early part of the year the flies did not attempt to bite the patient, but, beginning with October 12, they bit freely, sometimes drawing blood perceptibly. One of the monkeys in the experiments became ill, and a study is being made of the nervous system to determine the nature of the disease. These are among the first experiments made with the simulum and pellagra patients, and the outcome of the experiments will be watched with considerable interest.

Plague. ACTIVE AND PASSIVE IMMUNIZATION AGAINST PLAGUE. Frost² has reviewed this subject, and it is of particular interest in as much as plague is so widely disseminated throughout the world. During the ten years which elapsed between the identification of the bacillus pestis as the cause of plague and the discovery of the part played by rats and fleas, the chief efforts toward eradicating plague were based upon the belief that human cases were the most important sources of infection. During this time, and subsequently, the question of producing either an active or a passive immunity has been widely studied.

Haffkine, who was the first to use the method of preventive inoculations, used bouillon cultures that have been grown for six weeks and then sterilized it at 65° C.

The German Plague Commission, studying this method, came to the conclusion that the efficiency of Haffkine's virus depended solely upon the killed bacilli that it contained. They suggested a virus which could be more quickly and more easily prepared. This consists of using forty-eight-hour agar cultures of virulent plague bacilli. These were emulsified in normal salt solution, killed by heat, after which phenol was added to 0.05 per cent. Another virus was suggested by Lustig and

¹ Journal of the American Medical Association, February 24, 1912, p. 547.

² Public Health Reports, August 25, 1912.

Galeotti. This consisted of using twenty-four-hour cultures, emulsified in 0.75 per cent. solution of caustic soda and kept at about 10° C. for from twelve to twenty-four hours. The sediment is removed by filtration, and acetic acid added to the filtrate. This causes a white precipitate which is filtered off, dried in a vacuum, and powdered. For use, it is dissolved in a weak solution of sodium carbonate. They believe that this is a nucleoproteid with immunizing properties about equal to the killed cultures, with the advantages that the dose may be measured more accurately, that the powder keeps well in all climates, and that the reaction following its use is less severe.

Terni and Bandi have recommended a preparation made by inoculating the peritoneal exudate of guinea-pigs with the plague bacillus, and after it grows killing the bacteria without coagulating the albumin. They claim that by this method they can obtain in laboratory animals an active immunity within a few hours after inoculation, with only a mild reaction.

Shiga and Besredka have suggested the use of killed agar cultures mixed with specific anti-plague immune serum. This they claim is as efficient as the killed cultures alone, that the reaction after inoculation is less severe, and that immunity is established without a negative phase.

Strong succeeded in immunizing persons by the use of a long-cultivated culture of plague bacilli which he had found harmless to guinea-pigs and monkeys, but highly immunizing. This method, however, will probably never be used, generally, on account of the fear of using a culture which is not entirely free from danger, or of inoculating persons who are especially susceptible to plague infection. There seems to be no doubt that, by using the above methods, fairly satisfactory results may be obtained. Persons so inoculated are less liable to develop plague, and very much less liable to die with it in case they do develop it. The immunity conferred within the first few days is slight, and that which is produced does not last very long, probably several weeks or months. It is not dangerous to inoculate persons in the incubation period of plague, and reports seem to show that the injection in such may be of benefit in reducing the severity of the attack. It is highly probable that some more efficient method will be found. The production of the passive immunity, and of a serum to be used in the treatment of the disease, has also been a matter of considerable study; the only one which has been used extensively is that prepared by Yersin.

The reports on the use of this serum vary so widely that it is impossible to draw very definite conclusions concerning its value. In mild and moderately severe cases, with bubonic manifestations, it seems to be of some use; in the severe bubonic forms, it seems to be less useful, and it has no effect whatever on the pneumonic forms. As a prophylactic injection, the serum at present does not seem to be a great success, although it has some supporters.

THE TARBAGAN AND THE PLAGUE. Preble¹ has reviewed the question of the transmission of plague by the tarbagan.

This animal is found in Thibet and Mongolia, and is a sort of marmot. It seems that plague is epidemic in the several regions where this little animal is found, and it has been suggested that there is a close relation between the two.

It has long been known by the inhabitants of these regions that the tarbagan suffers from an epidemic disease which begins in the autumn before the hibernating season. The symptoms of the disease resemble plague. The animal is hunted late in the fall for its fur, and the hunters are extremely liable to be affected by plague. This is especially true of the imported coolies who, unlike the natives, are not able to distinguish the sick animals. The tarbagan is said to be susceptible to inoculations with the plague bacillus, and fleas have been found on them. Considering the part played by the transmission of plague by ground squirrels, rats, and their fleas, it seems quite probable that the tarbagan may be found to be an important factor in keeping up plague centres.

Pneumonia. From the standpoint of treatment, very little has been added to our knowledge of pneumonia, but a number of studies have been made which may lead to a better understanding of the disease and possibly to the discovery of some curative agent. These studies deal chiefly with the question of the action and nature of the pneumococcus poison, and questions relating to immunity. Cole² has reviewed a few of these questions and outlines some of the work which he and his associates have been carrying on. The question of why a person contracts pneumonia has been restudied, and the mere presence of the pneumococcus in the bronchi is hardly sufficient to explain the attack, as it is quite probable that this organism normally invades the lung, at least occasionally, in small numbers. It does not seem likely that it is entirely a question of virulence, for, while most of the cultures from the blood of pneumonia patients are of high virulence, at times the organisms seem to possess a relatively low virulence, and Meltzer has demonstrated that, in dogs at least, pneumonia may be induced by pneumococci of low virulence. The decrease of the general resistance which has been so much talked about does not seem to be responsible for pneumonia, or, at any rate, not entirely. From experimental studies made by Meltzer, Lamar, and Wollstein, it would seem that lesions resembling the pneumonia of man may be produced experimentally in dogs by a direct injection of quite large amounts of pneumococcus culture. This must be injected directly into the bronchus, and in such a manner that it will reach the finer air passages, or, as Meltzer has suggested, in such a manner as to occlude them. This has

¹ Public Health Reports, January 12, 1912, p. 31.

² Journal of the American Medical Association, August 31, 1912, p. 693.

led to the suggestion that the first step to pneumonia is an exudate which may be entirely non-specific in character, and which may be due to cold, trauma, etc., and the small bronchioles, being occluded by this exudate, cavities are formed which are no longer a part of the surface of the body but are shut off from the air. Pneumococci, being very frequently present, begin to grow, and it is quite possible when the pneumococcus is shut off from the air its growth varies, as Gillespie has shown that this is true of pneumococcus cultures. The newer studies have also shown that the disease probably starts in one part of the lobe and gradually spreads, and that the extension is not uniform but occurs in patches. The extension may progress until the entire lobe is involved.

Clinically, pneumonia presents the appearance of an acute intoxication. So far, the culture fluids of pneumococci have not been found to contain any toxin. It was thought that possibly in the living body the metabolic products of the growth of the pneumococci would be different from those forms in the test-tube, but the serum of rabbits which were inoculated with fatal doses of pneumococci, and bled just before death, when injected into a second series of rabbits, did not produce any signs of intoxication. A mild grade of acidosis occurs in all fevers, and it has been thought that the intoxication of pneumonia was due to an acid poison, but this has not been borne out by metabolic studies, as has been shown by Peabody. Cole and his associates find that a diluted solution of bile salts readily dissolves the pneumococci and that such a solution is highly toxic. The amount of bile salt in the solution given, apart from the pneumococcus, produces no symptoms whatever. It seems quite probable, therefore, that pneumococcus contains an endotoxin, but whether this causes the symptoms of the disease or not will have to be settled by further investigation. Studies have also been made upon the mode of recovery of pneumonia patients. The crisis, which occurs in pneumonia, would seem to offer a splendid opportunity for the study of what takes place when an individual recovers from an infectious disease, but very little is known concerning the actual process. At the present time it cannot be stated whether it is due to the destruction of the bacteria, to the neutralization of the poison, or to a kind of anaphylactic shock, or possibly a combination of all of these.

Studies in immunity have been undertaken for a number of years. Horses may be rendered immune to pneumococci by injecting living cultures intravenously, but there seem to be great difficulties in producing a passive immunity. It is possible to produce a serum which, injected together with a culture, will protect the experimental animals perfectly, but if the lethal dose of pneumococci is given first, and the serum injected some hours later, it is difficult or impossible to protect the animal, no matter how much serum is injected. Neufeld believes

that the doses of serums have been too small in proportion to the body weight. Dochez has found that it is necessary to increase the amount of serum, giving more and more serum as the number of bacteria is increased, and that, finally, a point is reached where no amount of serum, however great, is sufficient to save the animal. It is possible, therefore, that the body of the infected animal must take an active part, and that, in very severe infections, the body is so overwhelmed that there is not a sufficient reaction to permit of protection. It is possible that further work on using a vaccination and the administration of immune serums at the same time may give results which will be of value in the treatment of human pneumonia. This will have to be worked out upon animals, however, before it is used in man.

UROBILINURIA IN PNEUMONIA. The subject of urobilinuria is one which has been studied of recent years with considerable interest, and Hildebrandt¹ believes that it has a certain amount of diagnostic and prognostic value. Without going into the details of his studies, it would seem that while it might furnish a certain amount of information as to the commencement and end of the process of resolution, it probably has little practical value as a matter of diagnosis, although its presence places one on the right track in regard to the nature of the trouble. When one considers, however, that the same condition might be produced by an occlusion of the bile duct or by diarrhea, the diagnostic value of this sign becomes apparent.

BLOOD CULTURES IN PNEUMONIA. There has been considerable interest of late on the subject of making a diagnosis of certain general bacterial infections by means of blood cultures. With our present means of making blood cultures, this method cannot be applied except in hospital practice or exceptional cases. If the technique can be simplified, so that the blood may be taken readily without too much pain or fright on the part of the child, this method certainly will tend to be used more and more, particularly to clear up doubtful cases and also to further our knowledge of the bacterial infections in the various transmissible diseases. In place of the usual method of puncturing a vein, an ingenious suggestion of Blackfan² consists in using a small suction pump with a sterile glass bulb, and the tube so arranged so that the blood will flow into it. By using this simple apparatus, the blood may be taken from the back, the skin having previously been sterilized, and the results are said to be excellent. The question of finding the pneumococcus in cases of pneumonia has been studied by a number of different observers, with rather variable results. Prochaska claims to have grown the organism in 100 per cent. of his cases. All the other observers have succeeded in isolating the pneumococcus at times, but in a very much lower percentage. Cole succeeded in 30 per cent. of

¹ Zeitschrift f. klinische Medicin, 1911, Band lxxiii, Heft 3 u. 4.

² American Journal of Diseases of Children, July, 1912, p. 33.

his cases. Lyall,¹ in 30 cases in which there was a very low death rate, succeeded in growing the pneumococcus in 40 per cent. Cultures taken after the crisis or lysis have been uniformly negative. Sometimes other organisms are found, chiefly the streptococcus. Some years ago Rosenow had remarkable success, and he was able to grow the organism in 132 out of 145 cases. Further work along this line will be of great interest, and some of the points in regard to the treatment of pneumonia may be cleared out.

BLOOD PRESSURE IN PNEUMONIA. Gibson, of Edinburgh, has expressed his opinion of the arterial pressure in pneumonia as follows: When the arterial pressure, as expressed in millimeters of mercury, does not fall below the pulse rate, as expressed in beats per minute, the fact may be taken as of excellent augury, while the converse is equally true; that is, when the pulse rate per minute is higher than the pressure of the millimeters of mercury, the equilibrium of the circulation is seriously disturbed. This rule has been confirmed by some observers, but not by others. Lambert² reported his observations in a series of 48 cases. Twenty of the 48 patients showed Gibson's phenomenon, and, of these, 6 died, while of the 28 who did not show it, 5 died. Of course, patients with arteriosclerosis or chronic nephritis would not be expected to show it, and would be in far greater danger than other patients. It would seem that, in our present knowledge of the blood pressure in pneumonia, it is not safe to lay down any hard and fast rule, and the subject is one which would require a great many more observations before one could speak dogmatically about it.

SODIUM CITRATE IN PNEUMONIA. There have been numerous suggestions made for the treatment of pneumonia, especially with a view of cutting the disease short. Quinine has been the greatest favorite of these, but from time to time other drugs have been suggested.

Weaver³ has suggested the use of sodium citrate beginning early, preferably in the first three days of the illness. Large doses should be given, and these should be continued until the lung is cleared up. If the pulse and temperature remain stationary for from ten to twelve hours, the drug may be increased until the temperature falls again, and it should be kept up both night and day. Weaver states that there are variations in the behavior of pneumonia patients under this medication, but, if improvement begins in the first twenty-four to forty-eight hours, lysis may be expected early. He also suggests treating bronchopneumonia patients in the same manner, and this treatment does not interfere with any of the ordinary means of handling the disease, such as are usually employed. There has been a great deal of discussion on the value of sodium citrate and its action

¹ Journal of the American Medical Association, June, 1912, vol. lviii, p. 1841.

² Ibid., December 21, 1911, p. 1827.

³ New Orleans Medical and Surgical Journal, September, 1912.

on the blood and on inflammatory exudates, and this is one of those points which can only be settled by further observations.

RECTAL IRRIGATIONS IN THE TREATMENT OF PNEUMONIA. There is a point in the treatment of pneumonia which is generally overlooked and which is well to bear in mind, that is, the respiration of the patient is often embarrassed by the presence of tympany, and sometimes the circulation is also interfered with, so that this one thing may cause a fatal result. Medical students are generally taught that the bowels of pneumonia patients should be moved daily; in this connection we may call the attention to Rutz, who suggests a daily lavage of the rectum using soap and water in the morning, adding to this a small amount of glycerin, and, in case of excessive meteorism, a small amount of turpentine. He also suggests the daily use of several rectal injections of normal salt solution, to which from 30 to 60 grains of sulphate of magnesia have been added; if, under this treatment, the stools become too frequent, the magnesia may be diminished. He also advises the patient to drink as much water as possible, and not to swallow their sputum; in addition to this, he suggests the frequent use of an antiseptic solution as a mouth wash. He has had a series of cases in which he has had unusually good results. This is probably a matter of coincidence, but at the same time the systematic care of the patient, with regard to constipation and the presence of gas in the bowel, not only adds to the patient's comfort but lessens the danger of death.

Pneumococcal Peritonitis in Children. Barling¹ has contributed a most interesting article on this important subject, which, for some reason, has not had the attention paid to it which it would seem to merit. Infection by the pneumococcus has been studied more of recent years. In adults, apart from the lungs and pleura, lesions caused by it are comparatively rare, and when it does cause trouble it is almost always localized. In children, however, it frequently gives rise to lesions in the joints, epiphyses, meninges, peritoneum, pericardium, middle ear, and the subcutaneous tissues. Sometimes these lesions are multiple, and indicate a general pneumococcal septicemia. Pneumococcal peritonitis is of rather greater frequency than is ordinarily supposed, and Barling was able to collect 234 cases, of which 62, or 27 per cent., occurred in males, and 172, or 73 per cent., in females. Just why female children should suffer more than males is not at all clear. It was formerly thought that it might be associated with purulent vaginal discharges, but, as a rule, this is not the case. The possible routes of infection are by the vascular system, as in a general septicemia; by direct transmission, through the lymphatics of the diaphragm, from lesions in the lungs or pleural cavity; through the intestine itself, and, in the female, through the vagina and Fallopian tubes. Jensen did succeed in producing peritonitis by feeding rabbits and mice on virulent

¹ Practitioner, April, 1912, p. 557.

cultures of pneumococci, but it is quite probable that the peritoneal lesion is almost invariably the result of a septicemia. It is particularly liable to occur in connection with other lesions; thus, out of 28 cases, one or both lungs were affected in 19, one or both pleural cavities also in 19. In 3 cases, the pleural cavities were affected, but not the lungs, and in 3 cases the lungs were affected, but not the pleura. The pericardium was involved in 6 cases, and all of these 28 proved fatal and all were regarded as pneumococcal septicemia. In many of the cases, the disease starts in the lungs and, following this, even at comparatively long intervals, there may be the development of septicemia, but in some cases the primary lesion may be elsewhere in the body, the middle ear or the throat being the most frequent site after the lungs and pleura. The appearance presented by the peritoneal cavity is very characteristic; the bowel is inflamed and distended and the coils are lightly glued together by the roughening of the peritoneal surfaces and the fibrinous exudate. The whole peritoneal cavity is involved, and there is an exudate consisting of serous fluid containing large fibrinous, or fibrinopurulent, greenish-yellow flakes. As a rule, the exudate is odorless, but it is sometimes infected secondarily by the colon bacillus, particularly in long-standing cases. In the more chronic cases, the fluid may disappear, leaving firm fibrinous adhesions. Clinically, the cases may be placed in three groups; first, the very acute cases, presenting marked abdominal features from the beginning, with no other lesions apparent in other parts of the body; these cases usually begin with diarrhea, vomiting, severe abdominal pain, and high fever. About one-half of these cases die. The second class contains those cases which develop a pneumonia at the same time as the peritonitis, or very close to its onset; these cases start also with vomiting, diarrhea, and abdominal tenderness but have, in addition, a rapid breathing and other physical signs and symptoms of pneumonia. Almost all of this class prove fatal. The third group of cases are more chronic in character; there is usually a pneumonia and empyema of several weeks' standing; the patient gradually grows weaker, peritonitis develops with the usual symptoms, and this usually means a fatal outcome, almost all of this class dying.

The diagnosis may be readily made, in the cases which present typical abdominal symptoms, when there are pneumococcal lesions elsewhere in the body. When the peritonitis is the only lesion present, the cases are very liable to be confused with an acute appendicitis, and particularly is this so if the tenderness and rigidity happen to be localized in the right iliac fossa. In these cases, the diagnosis from appendicitis may be impossible, but very early and diffuse rigidity and tenderness, particularly if accompanied by an initial diarrhea, should very strongly suggest a pneumococcal peritonitis. Another point of difficulty in diagnosis is the well-known abdominal symptoms

occurring in pneumonia without any involvement of the peritoneum. These cases present rigidity, tenderness, and pain, but this is chiefly in the upper part of the abdomen, and the symptoms are usually of short duration or not constant. Vomiting may occur at the outset but is not persistent, and diarrhea is absent. The subacute cases of pneumococcal peritonitis may be mistaken for typhoid fever or tuberculous peritonitis. In tuberculous peritonitis, the constitutional symptoms are usually less severe, and while about one-third of the cases may have a rather acute onset, the presence of high fever should at first suggest the pneumococcus rather than tuberculosis. In the pneumococcal infections, there is a leukocytosis, which is absent in the tuberculous cases.

The prognosis of pneumococcal peritonitis is rather bad, and the mortality is in the neighborhood of 80 per cent. In the cases in which there are localized collections of pus, early evacuation does much to favor recovery. Incision and drainage of the peritoneum, where there is general involvement of it, usually fail to relieve most cases. When the operation is done as little time should be wasted as possible; the drain should be carried well down into the pelvis, there should be no wiping or irrigation of any kind, the patient should be placed in the Fowler position, and a saline solution should be given freely, if possible by the Murphy method. In the very chronic cases with localization, autogenous vaccines may be used, but the results from vaccines have not been as satisfactory as one might expect.

Poliomyelitis. The interest in poliomyelitis has continued, chiefly because the disease has spread over practically all the United States, and there have been large numbers of cases and a large number of deaths. Owing to the fact that most of the cases which recover are more or less permanently paralyzed, the public has a proper appreciation of the gravity of this disease. There has been a disposition to study the disease very carefully, and several most excellent reports have been published, among which may be mentioned the Report of the State Board of Health of Massachusetts on the occurrence of the disease in that State during 1910, together with reports of special investigations made in 1911 bearing on the etiology of the disease and the method of its transmission; a smaller and somewhat similar report by the Washington State Board of Health; in addition to these, there have been numerous journal articles bearing on the various clinical and pathological questions. A great amount of the material published is merely a repetition of what has been published before, either substantiating some of the opinions or giving additional statistics or reports of cases.

There are four subjects of very great importance: (1) How is the disease transmitted? (2) How may the diagnosis be made? (3) How may the disease be prevented? (4) How ought the disease be treated?

The *transmission of the disease* has been the chief object of study, and there are a great many curious things which have been brought out by various observers. In the first place, there is a tendency for the disease to recur every other year. For example, in Massachusetts if the disease was severe in a certain town one year, the following year it was almost certain that there would be no cases or very few. Curiously enough, this tendency to a two-year periodicity holds good for the entire world. For example, in 1905, there was the Scandinavian epidemic; in 1906, there was no great epidemic; in 1907, there was the New York epidemic; in 1908, there was no great epidemic; in 1909, there were epidemics in Massachusetts, in Minnesota, and in Nebraska, two large and one small epidemic in Germany, not to mention epidemics which occurred in Austria and Cuba.

The occurrence of the disease in the United States has not been as thoroughly studied as the importance of this subject would warrant. This is largely due to the fact that the disease is poorly reported to Boards of Health, in some cases only deaths being reported, so that from the figures that are available one cannot state with definiteness just how many cases or how many deaths there were. We do know, however, that the number of cases stated is far below what actually occurred. Every State and every county should see to it that every physician is informed of the importance of reporting, not only deaths, but cases as well, and every State should make the disease reportable by law.

In 1910, from the figures available, there were 5861 cases and 950 deaths. In 1911, there were 1931 cases, with 440 deaths. From my own experience with the disease, I am convinced that many of the fatal cases are not recognized, and these are reported in the mortality statistics as either meningitis, gastro-enteritis, or under some other heading. The atypical cases are also often mistaken for other diseases, so that there must be a very large number of deaths and a very large number of cases which do not show in the health records, even in the places which have more or less thorough systems of collecting statistics.

In the so-called intensive studies that were made, the disease was studied from every possible standpoint, with the view of determining, if possible, how it is transmitted. It was soon noted that it was a disease of smaller cities and towns, not exclusively it is true, but the distribution was very suggestive. Whatever other difference may exist between small towns and the very large cities, the question of flies, mosquitoes, and small animals, must be remembered. The seasonal occurrence suggests very strongly that a large number of the cases might be transmitted by some insect, as almost all the cases occur between June and November. It was further noted that children living in institutions were not as frequently affected as those living in homes, and this was thought to be due to the lessened contact with the outer world, but it may be due to other influences.

In the studies made in Massachusetts it was found that flies were noted as being present in 90 per cent. of all the cases, and that small animals were kept in 60 per cent. of the cases. In a report made to the Massachusetts State Board of Health in 1911, Brues and Sheppard suggested the probability of the disease being transmitted by the ordinary stable fly, *Stomoxys calcitrans*, as this was the only insect, beside mosquitoes, which they found associated a sufficient number of times to lead them to believe that it might be the means of transmitting the disease. The fact that sporadic cases cannot be otherwise explained, that the disease is most prevalent during the fly season, that most of the cases have not been in especially close contact, and that the disease is not so prevalent in large cities, bears out the opinion which they have expressed. This suggestion was followed up by Rosenau¹ who announced, at the Fifteenth International Congress on Hygiene and Demography, that he had succeeded in transmitting poliomyelitis from sick to well monkeys by the bite of the common stable fly. The flies were allowed to bite monkeys with poliomyelitis in various stages of the disease, and then later these same flies were allowed to bite healthy monkeys. Out of 12 monkeys, 6 became ill with well-marked symptoms of poliomyelitis, and 3 died. Three of the 6 monkeys thus infected had diarrhea and symptoms of enteritis during the course of the illness. It seems that, after biting the infected animal or person, some time must elapse before the fly is capable of transmitting the disease, and that this period is probably less than twenty-one days. The stable fly resembles the common house fly in size and appearance, and, while it is most commonly found about stables, it is by no means uncommon in dwellings, and it bites both man and animals. Following this work, Anderson and Frost² repeated the experiments made by Rosenow and they have confirmed his conclusions, and state that the disease may be transmitted to monkeys through the agency of the stable fly. It now remains for further work to decide whether this is the usual or the only method of transmission in nature.

The virus of the disease has been found in various secretions of the body, and, in addition to the studies made by Flexner, Lewis, and Clark, this subject has received special attention by Kling, Wernstedt, and Petterson.³ They found that the virus is present in the secretions of the mouth and intestines in the acute stage of the disease. They also found it in convalescents, in obscure cases, and in healthy individuals. They were able to demonstrate it in the intestinal contents by filtering the material through a filter small enough to prevent the passage of the bacteria. The question how long the virus persists in the body is one of great importance from a practical standpoint, and one which

¹ Public Health Reports, September 27, 1912, p. 1573.

² *Ibid.*, October 25, 1912.

³ *Zeitschrift f. Immunitätsforsch.*, 1912, p. 316 and 596.

will have to be thoroughly studied experimentally. The authors mentioned above have showed that the virus persists in the secretions of convalescents more than four weeks after the onset of the illness, and this was shown in 8 out of 9 cases studied. In one case, the virus was found in the seventh month; in one case, in the fourth month; in 4 cases, in the fourth month; and, in 3, in the fifth week after the onset of the symptoms. It would seem that the virus persists for a long time after all acute symptoms have subsided. How long, we do not know as no observations have been made after an interval of more than seven months. They also studied healthy individuals who had been associated with cases of poliomyelitis, and virus carriers were found in 6 families. Whether the disease may be transmitted from these carriers by flies or other agencies is not known at the present time, and this is another subject which will have to be studied in the future in order to put the prophylaxis of this disease on a sound scientific basis and to prevent the possible working of useless hardship on a great many people. It has also been shown by Lucas and Osgood¹ that an immunity to the commoner bacterial infections in no way protects the human race from poliomyelitis, and, in this connection, one recalls the experiments of Landsteiner and Levaditi.² They found that the specific inoculations carried out with the virus of rabies, a disease much more closely allied to poliomyelitis than the ordinary infections, produced in monkeys no immunizing effect whatever, and also that the reverse is true that inoculations with poliomyelitis produces no effect in cases of rabies.

INFECTION OF RABBITS WITH THE VIRUS OF POLIOMYELITIS. Marks,³ working in the Rockefeller Institute, made some observations upon the much mooted question of the susceptibility of the rabbit to the virus of poliomyelitis. He determined that there were differences in various rabbits, some of which were not susceptible. His experience with young rabbits, weighing from 350 to 550 grams, was that he could produce certain changes. The virus with which he experimented was that which had been in the laboratory of Flexner and Lewis for the last two years, and the inoculations were made with the filtrate of parts of the central nervous system of infected monkeys filtered through a Berkefeld filter. The inoculations were made into the brain, into the peritoneum, and intravenously. None of the rabbits presented lesions similar to those of poliomyelitis in man or in the monkey. The rabbits presented certain clinical symptoms, consisting of tonic or clonic convulsions, and, in 3 cases, the retro-inoculation from the affected rabbit to a Rhesus monkey caused a typical poliomyelitis, both clinically and anatomically. The virus was passed through 6

¹ Report of the State Board of Health of Massachusetts.

² *Annals de l'Institut Pasteur*, November, 1911.

³ *Journal of Experimental Medicine*, vol. xiv, p. 116.

rabbits, was lost in the seventh, and it was apparently by chance that it was given this time to a rabbit which was not susceptible. Positive retro-inoculations were made on the monkey after the second, the fourth, and the sixth passages in the rabbit. The virus is found in the spleen and liver, in addition to the usual sites. Marks believes that it is possible that the rabbit may act as a reservoir of the virus of poliomyelitis, although this subject will have to be studied further.

THE DIAGNOSIS OF POLIOMYELITIS. No very new facts have been brought out regarding the diagnosis of the disease, although the symptomatology of the more unusual forms has been carefully studied. One of the best accounts will be found in the *Public Health Bulletin*, No. 44, published in 1911, in which Frost has gone over the subject in a very masterly manner. This publication may be obtained from the Superintendent of Documents in Washington.

THE PROPHYLAXIS OF POLIOMYELITIS. The question on the prophylaxis of the disease is a very important one. In the first place, with a disease of such gravity, if a mistake is to be made it should be made upon the safe side. On the other hand, we know, from our experience with yellow fever, the immense amount of hardship and the useless destruction of property caused by an insufficient knowledge of how the disease was transmitted, and every thoughtful health officer who has to do with infectious diseases will realize that it is very important to prevent the useless detention of people and the unnecessary destruction of property. Further studies will have to be undertaken to determine many points in regard to the transmission of the disease, but, at the present writing, I think, it is safe to assume that the following precautions should be carried out. First, every case that is recognized should be strictly isolated in a screened room. All patients, and all persons coming in contact with the patient, and all those who have been in contact with the disease, should use sprays of the nose and throat of 1 per cent. peroxide of hydrogen. This may be obtained by diluting the ordinary commercial peroxide of hydrogen which has a real contents about 3 per cent. This is suggested on the experimental observations of Flexner, Lewis, and Clark, that peroxide of hydrogen of this strength will destroy the virus of the disease. A prophylactic measure which may also be used, certainly until we know more about the disease, is the administration of *hexamethylenamin*. It has been found by the above observers that animals to whom this drug had been given in sufficient quantities have been protected from the experimental inoculations, so that it would seem a rational procedure to administer this drug to those who have been living under the same conditions as a person who has contracted the disease. How long the quarantine should continue is an open question. I should say, in the state of our present knowledge, certainly four weeks, and six weeks would be a very much better period. If an absolute quarantine

cannot be maintained, at least a partial quarantine, and, as far as possible, the individual should be protected from flies by the use of screens or mosquito netting. Porches may be easily and cheaply screened for short periods of time by mosquito netting, so that the patient may be placed in the fresh air or in a tent made of mosquito netting. As we do not know whether the disease is transmitted by direct transference by saliva or nasal secretions, or by contact with urine or feces, it would seem a wise precaution to sterilize eating and drinking utensils and to use care to disinfect the discharges of the patient, particularly if they are to be exposed to flies. Dust should be suppressed as far as possible, and, in the presence of an epidemic, a very active campaign should be taken against the fly. There is no reason why such a campaign should not be taken on the grounds of comfort and decency, and certainly, in the presence of a disease of such frightful gravity as poliomyelitis, even a most lethargic community could be stirred into activity. The methods of getting rid of flies has been the subject of more or less study, and I commented on this subject last year.¹

The *treatment* of the disease is rather unsatisfactory. In the absence of any other therapy, I have administered *hexamethylenamin* in rather large doses, and, in the cases seen three or four days after the onset, I believe I can state that the drug was without any beneficial effect. Whether it has any effect on the cases seen earlier, or not, I am unprepared to say.

Clark² has suggested the use of *epinephrin*. Meltzer, in 1903, showed that this drug exerted a marked change in the local inflammation. The lesions of poliomyelitis are associated with profound alterations in the bloodvessels, and it is quite possible that, by its use of epinephrin, a temporary cessation of the exudation may be brought about and this may have some benefit in limiting the spread of the disease. Clark studied the action of the drug upon monkeys, in the animals used which were exclusively paralyzed or moribund, and it was thought the life of the animal was often greatly prolonged and the effects of the drug on the general condition were often remarkable. It is possible that, if the drug is used earlier, the life of the animal might be saved. It would be interesting to have experimental studies made with this point in view, and in very severe cases in human beings there certainly could be no objection to making intraspinal injections of the drug. The dose varied between 1 and 1½ c.c. of 1 to 1000 epinephrin.

Rabies. RABIES IN THE UNITED STATES IN 1911. Stevenson³ has briefly considered the prevalence of rabies throughout the United States. In PROGRESSIVE MEDICINE for March, 1910, I commented

¹ PROGRESSIVE MEDICINE, March, 1912, p. 111.

² Journal of the American Medical Association, August 3, 1912, p. 367.

³ Public Health Reports, July 28, 1912, vol. xxvii, No. 28, p. 1028.

upon the investigation which was undertaken in 1908, and the results of the present study are of such interest that I have reproduced the table entire.

Ninety-four of ninety-eight fatal cases showed the following:

ANALYSIS OF FATAL CASES IN MAN

Distribution as to Age (Data Given in 94 Cases)

Age.	Cases.
1 to 10 years	44
11 to 20 years	15
21 to 30 years	8
31 to 40 years	9
41 to 50 years	8
51 to 60 years	2
61 to 70 years	5
71 to 80 years	2
81 to 90 years	1
Total	94

Period of Incubation (in 65 Cases)

Period.	Cases.
10 to 20 days	11
21 to 30 days	19
31 to 40 days	9
41 to 60 days	8
Over 2 months but less than 4 months	10
4 to 6 months	3
6 to 12 months	2
Over 12 months	3
Total	65

There are two or three points of great interest. One is that rabies has spread to the Pacific coast States which were apparently free from the disease at the time of first investigation. It will also be noted that there has been a great increase in the number of localities in which rabies has been noted. In contrast with this increased distribution in the lower animals, there has been a diminution in the number of human deaths, amounting to nearly 12 per cent. This decrease I believe is due to the fact that more persons bitten by rabid animals are promptly treated by the Pasteur method. The number of persons shown to have taken treatment in 1908 is about 1500, while in 1911 there were 4625 treated. These figures seem to disprove conclusively the claim, which is occasionally advanced by the opponents of the Pasteur method, that this treatment causes, rather than prevents, rabies. The growth of institutions where the Pasteur treatment can be administered is remarkable. In 1908, there were 23 institutions in the country, while at present there are 42 such institutions, and at least five firms and public laboratories that furnish material for inocu-

lations to practising physicians. These latter have been made possible by the use of vacuum bottles which prevent the contents from being heated.

A COMPARISON OF THE ANTIRABIC TREATMENT WITH FRESHLY PREPARED VIRUS WITH THAT SENT TO A DISTANCE. Poor¹ has made a study based on a series of 2851 cases treated from May, 1906, to September, 1911. Only those cases are considered in which data was available to show that the infected animal was evidently rabid. Out of this total, 2108 cases were treated with virus sent from the laboratory, and 737 were treated at the laboratory. The total mortality in the first series was 0.06 per cent., and, in the latter series, 0.9 per cent. Excluding cases which died during the period of observation, the results were 0.0028 per cent. in the cases treated at the patient's homes, as against 0.0018 per cent. in the cases treated at the laboratory. There are two reasons for the difference in the figures, although the difference is very slight, the first being a somewhat larger proportion of head bites in the cases treated at the laboratory, and, secondly, the possible carelessness of physicians in administering the treatment or in reporting the deaths. There is probably a slight loss of virulence in the emulsions that are sent out from the laboratory, but this does not follow that there is any loss in immunizing properties. These figures would seem to prove that, for all practical purposes, satisfactory results might be obtained with virus sent out from the laboratory.

THE LATE CAUTERIZATION, BY MEANS OF NITRIC ACID, OF WOUNDS INFECTED WITH RABIES. Poor² has contributed a short note upon this subject which is of very considerable practical interest. It consists of a repetition, with some variations, of some experiments as made by Cabot, in 1898. Cabot's experiments show that nitric acid is by far the best form of cautery to use in wounds infected with rabies, and he saved 76 per cent. of the animals so treated. Poor's experiments simulate more closely the conditions as they occur in actual practice, and he summarizes his results as follows:

After the removing of the hair with barium sulphide, an incision was made in the back of the neck of the guinea-pigs and the subcutaneous tissues on either side cut in several places with the scissors. This wound was infected with a swab dipped in an emulsion of street virus, and the edges of the wound brought together with adhesive plaster. At the end of twenty-two hours the wounds, in one series of animals, were opened up and the tissues treated with another swab dipped in nitric acid. After excluding a number of animals which died from accidental causes, there remained twelve in the series treated with the acid and eight controls. All of the latter died of rabies with an

¹ Studies from the Research Laboratory, Department of Health, New York City, 1911, p. 23.

² *Ibid.*, p. 25.

average incubation of twenty days. Five of the treated animals had shown no symptoms of rabies two months after infection, at which time they were discharged. The remaining treated animals died of rabies, with an average incubation of twenty-three days. Forty-four per cent. of the treated animals were therefore saved by cauterization with nitric acid at the end of twenty-four hours.

A CASE OF HUMAN HYDROPHOBIA CURED WITH SALVARSAN (?). Tonin¹ has reported a most remarkable instance of what he believes to be a cure of hydrophobia following the use of salvarsan. The observer is the physician in charge of the Pasteur Institute at Cairo, and has had eight years' experience in the preventive treatment and ample opportunities of seeing cases of rabies. Heretofore all methods of treatment have failed. These have included the use of carbolic acid, mercury, and other substances.

The patient was a girl, aged thirteen years, who was bitten on March 28 by a stray dog that had been brought home by her brother. The dog was sick, was hoarse, had a cough, and refused food and drink. The bite was upon the foot through a very thin stocking. The wound was lacerated and, while not deep, bled somewhat. The following day the dog disappeared and could not be found.

Twelve days later the patient started the cure at the institute, and after fourteen days, that is, on April 21, she commenced to suffer from slight fever, malaise, and headache. The treatment was stopped, and for the next three days all the symptoms were aggravated. She refused food and drink, and was unable to swallow liquids. On April 24 she was sent to the hospital. A description of the symptoms were typical of rabies. That evening the patient was given chloral and bromide by the rectum and on the following day the condition, if anything, was worse. She was then given an injection in the brachial vein of 30 centigrams of salvarsan in 30 grams of solution. This was rather a large dose, but thought advisable under the circumstances. The patient had some temperature, rapid pulse, and repeated vomiting, but, after eight hours, the general conditions was better and the patient was able to swallow small quantities of water. There was no laryngopharyngeal spasm, but only a certain amount of dysphagia. On April 26, twenty-four hours after the injection, the general appearance of the patient was very much better. Hyperesthesia disappeared, and the patient was able to swallow liquids with little difficulty. On the following day all the symptoms had completely disappeared. The patient was able to swallow easily and could be fanned on the face without producing any symptoms.

She commenced, later, to complain of formication in her feet and difficulty in moving, and, on the following days presented the picture

¹ Il Policlinico, Sezione Pratica, July 14, 1912, p. 1041.

of an ascending myelitis involving the legs, and arms, and going as far as the medulla, causing grave disturbances of respiration and circulation. The pulse and respiration were rapid. There was frequent vomiting, and intense headache. There was also facial paralysis, and the oculomotor nerves were involved. On May 3 there was slight improvement in the legs, and this rapidly increased, going upward. After a few days the patient became entirely normal and was able to leave the hospital.

Tonin himself discusses the objections which might be raised to his report, one being that the case was not one of true hydrophobia but one of lyssaphobia. He is quite certain, however, that the diagnosis was correct. There was no psychic disturbance to amount to anything, and the patient was not preoccupied with her disease and indeed did not understand the gravity of it. The paralysis is to be explained on the ground that the salvarsan destroyed the organism but not the toxin already present, and the case might be regarded as one which had been turned into the paralytic form. Another objection, that the symptoms might have been caused by the antirabic treatment might be disposed of by the fact that no true cases of hydrophobia have ever been reported as following the pasteur method of treatment. There have, of course, been a few cases in which there has been paralysis and this case has some of the features of a post-treatment affection.

If Tonin's observations are confirmed, it will mean a very great advance in the therapeutics of rabies, as heretofore to all cases have been uniformly fatal.

The Rat-bite Disease. In China and Japan, there exists a disease which follows the bite of rats, known as *sokodu*, and which the Germans call *Rattenbisskrankheiten*. Some two years ago Horder reported a case, and the disease has also been reported by Wright, in England. More recently, Frugoni¹ has reported a case which occurred in Italy. Ogata believes that the disease is of parasitic origin, and is transferred to man by the bite of infected rats. The bite heals more or less rapidly, and two or three weeks pass before the disease makes its appearance; then the site of the bite becomes the seat of an intense inflammation, sometimes going as far as to the formation of ulcers, and, at the same time, causing severe constitutional disturbances, consisting of intermittent fever, chills, headache, and vomiting. There is also marked swelling of the lymph nodes, not only about the region of the bite, but more or less generally. There are also cutaneous manifestations, consisting of exudative erythema. The curious part of the disease is that it may last for years, there being periods in which the patient is in good health, which alternate with the symptoms just given.

¹ *Revista Critica di Clinica Medica*, December 16 and 23, 1911; *La Semaine Médicale*, March 20, 1912, p. 138.

Frugoni found that there was a severe esinophillia, and, in his case, there was also a complication not noted before, which consisted of exophthalmos, with ecchymosis in the conjunctiva, and considerable chemosis.

THE TREATMENT OF RAT-BITE DISEASE BY SALVARSAN. Hata¹ relates 8 cases of this disease, observed in Japan, which were treated with injections of salvarsan. The injections were given at various stages of the disease, some after five and even after ten attacks; some in the apyretic stage, some during the fever, and some immediately after the decline of the fever. In five of the cases, the patients were apparently cured. There was some fever after the injection. Following it, there was remarkable improvement in the general health, with the disappearance of the inflammatory phenomena and of the skin rashes, and a progressive reabsorption of the enlarged lymph nodes. The results obtained are sufficiently encouraging to recommend this method of treatment for a heretofore incurable disease.

Rheumatism. So far as I know, there have been no contributions that have added materially to our knowledge of this disease during the past year.

Tick Eradication and Rocky Mountain Spotted Fever. McClintic² reports on the work done in Montana in coöperation with the State Board of Health concerning the possibility of eradicating Rocky Mountain spotted fever. The disease has been reported from practically all of Rocky Mountain States, but, during the last ten years, it has spread so that it has become a serious hygiene problem. In the last two years in *PROGRESSIVE MEDICINE*, I have noted interesting investigations in connection with this disease, particularly the work of Ricketts and those who followed him. The disease is transmitted by the bite of the *Dermacentor Andersoni*. For purposes of determining what can be done, it was decided to select a limited area in one of the worst infected territories and to put into operation the best known measures for the eradication of the tick. It was also considered advisable to continue the work which had been begun by Ricketts of testing the wild animals for their susceptibility to spotted fever.

An area of about eight square miles was selected about three miles from Victor, Montana. In this area there are large numbers of ticks, and there have been many cases of spotted fever; indeed, the territory has been almost depopulated on account of its presence. Most of the cases occur during the months of April and May, so that the latter part of May was very late to begin the work. The ticks begin to decrease in number during the months of June, and by the first of July they have largely disappeared, though a few may be found throughout the year. Two measures were put in force in the selected

¹ Münchener medizinische Wochenschrift, April 15, 1912.

² Public Health Reports, May 17, 1912, p. 732.

area, (1) the dipping of the domestic animals known who harbor the tick, and (2) the killing of the wild mammals. A dipping trough was constructed, and an arsenic preparation recommended by the Bureau of Animal Industry, sold under the commercial name of "Tixol," was used. Horses, cattle, and sheep were dipped in this preparation, and, after an interval of two weeks, redipping was begun but as the stock, upon examination, was found to be practically free from ticks, the dipping was soon discontinued. At the same time ground squirrels, pine squirrels, chipmunks, wood rats, woodchucks, weasels, and badgers were hunted, and a total of over 3000 were killed, not including those which were killed in their burrows by the use of carbon bisulphide. A great many ticks are also destroyed by forest fires, and it is possible that systematic burning of certain areas under the supervision of experts from the Bureau of Forestry might be of great help, but this part of the question is at present undecided. As the tick is seldom found on land under cultivation, the clearing of the land is also a valuable method of fighting the disease. Considerable work was done on the animals captured, but other investigations will be needed before definite conclusions can be drawn. It is very probable, however, that badgers, coyotes, and domestic cats play no part whatever in transmitting the disease, except that they may occasionally carry infected ticks into dwellings. One weasel was found to be susceptible to infection, and the studies on the squirrels were such that conclusions cannot be made at this time. Rhesus monkeys and guinea-pigs were infected with spotted fever, and treated with different drug preparations, salvarsan, sodium cacodylate, and urotropin. From the number of animals experimented on, it does not seem that any of these drugs is of value either as a prophylactic or in the treatment of the disease. If anything, their administration seems rather to intensify it. These investigations are to be continued, and results will be watched with interest, as it is seldom that large hygienic problems have been attacked in this manner. The results obtained in the prevention of malaria, yellow fever, and the hookworm lead one to believe that a great deal may be accomplished.

Scarlet Fever. There have been a considerable number of observations made on scarlet fever, with particular reference to *the etiology*. It is pretty generally admitted that streptococcus is not to be regarded as the cause of the disease, although it is almost always present in large numbers in the throat and tonsils, and, in severe and fatal cases, in the circulation. It is also recognized that most of the complications and deaths are apparently due to the streptococcus, which make it a matter of very great importance, even though it is a secondary invader. The blood of scarlet fever patients shows the presence of antibodies, and while the streptococcus may not be specific for scarlet fever, many have tried to show that it apparently acquires certain

characteristics by growing in the body at the same time with the scarlet fever virus, whatever this latter may be. This, however, is not peculiar to scarlet fever, for it has been demonstrated that the streptococci found in smallpox may be agglutinated with the serum from other smallpox patients, but not by any other immune streptococcus serums. In smallpox, there is, of course, no question of the streptococcus being a secondary infection. The streptococcus vaccine has been extensively used by Russians,¹ and the number of children vaccinated runs into many thousand. In about 10 per cent. of the children there were rather severe local reactions and, in some, a general scarlatiniform eruption, and other symptoms suggestive of an attack of scarlet fever. Some of the Russian observers, as Vladimoff, believe this is conclusive evidence that the streptococci is the cause of scarlet fever, but this, taken into connection with the other facts concerning the disease, would not seem to be the case. The protection from scarlet fever varies with the number of vaccinations, those having had 3 showing the best results and those having had 2 showing better results than those having had only one. The streptococcus vaccine has been used in Boston by Watters² without any untoward effects. Koessler,³ and others, have made studies concerning the presence of antibodies for an unknown virus. Using a reaction along the lines of the Wassermann method, they found that this unknown virus seems to be present, especially in the cervical lymph nodes. These observations, taken together with the production of experimental scarlet fever in monkeys, places the subject on a basis for further investigation, and doubtless many new facts will be placed at our disposal in the next few years.

SCARLET FEVER SERUM. There have been a large number of efforts made to obtain an efficacious serum to be used in the treatment of scarlet fever, and among the procedures that have been used is one to obtain the serum from those who have had the disease. Among the earlier experiments in this line are those of Weisbecker, who, as early as 1897, believed that he obtained favorable results, and a few years later, in 1902, von Leyden, Huber and Blumenthal treated 16 cases and were favorably impressed. More recently, Reiss and Jungmann have reported their experiments. They obtained the blood from patients who had had the disease, and it was usually taken from the 18th to the 24th day after the onset. From 100 to 200 c.c. were withdrawn, centrifugalized, and mixed with serum from other patients, placed in the sterile ampoules of 50 c.c. each, and to each one of these there was added a 5 per cent. carbolic acid solution. The serum was tested to insure its being negative to the Wassermann reaction, and cultures were made before it was used to insure its sterility. From

¹ Smith, Boston Medical and Surgical Journal, 1910, clxii.

² Journal of the American Medical Association, February 24, 1912, p. 546.

³ Ibid., October 26, 1912.

40 to 100 c.c. were injected intravenously. They treated, in all, 12 cases of the severest type. In two of these, there were no results; in the other 10 the results were quite satisfactory. In from two to four hours after the injection, the temperature began to fall; following this, there were a number of rises of temperature, which were not severe and of not very long duration, and finally the temperature reached, and remained, normal. The pulse became better, the respiration also became normal, and there was a decided improvement in the general condition of the patient. In cases in which there were secondary infections and streptococci, the serum was without effect on these complications. They recommended that the serum be given as early as possible, and not later than the fourth day, if it is to be efficacious.

MOSER'S SERUM IN SCARLET FEVER. Schick¹ has reviewed the experience of over seven years with Moser's serum in the children's clinic in Vienna. Moser's serum is made by injecting various strains of streptococci from the heart blood of scarlet fever cadavers into horses.

The streptococci are cultivated in bouillon, and the living cultures used. Among the objections to Moser's serum are that it does not keep well, that very large doses are required, 200 c.c. for older children and 100 c.c. for infants, and also that the serum cannot be standardized on animals. The cases in which it is most valuable are severe or malignant cases, particularly those in which there is only moderate, or no, involvement of the throat.

In the main, the results have been satisfactory, the most valuable reports having come from Russia where remarkable lowering of the mortality is claimed. However, it would seem, that, if this serum does possess sufficient curative properties to make it worthy of general application, it has been on trial long enough to have demonstrated its value.

TRANSMISSION OF SCARLET FEVER. There is a great tendency to restudy the question of the transmission of infectious diseases. Quite a number of mistakes have come down to us from our ancestors, and most of these are continued chiefly from lack of definite information to the contrary, but one by one these points are being cleared up. It has been taught from the earliest times that the virus of scarlet fever lived for a long time on fomites. This has been questioned from time to time, and a study of more than usual interest has been made by Nesbit.² In his capacity as President of the Board of Health of Valparaiso, Indiana, he undertook to make a study of the question of the possible transmission of scarlet fever by books, particularly books used in public libraries and reading-rooms. It will not be necessary to go into the details of his experiments. Studies were carefully made and if books act as carriers it is only immediately after being

¹ *Therapeutische Monatshefte*, April, 1912, No. 4, p. 237.

² *Journal of the American Medical Association*, October 26, 1912.

contaminated with the discharges of the patient, and yet, in spite of the most searching investigations, Nesbit was unable to find a single instance of this kind. It also appears certain that books which have been used by scarlet fever patients do not contain the virus in such a way as to transmit the disease to man. Any book which has been handled by a scarlet fever patient should be burned or fumigated. Perhaps at a later date, when these observations have been confirmed a number of times, the fumigation may not be so strongly insisted upon. At the present time, whether there is danger or not of transmitting disease, it will have to be in deference to public opinion. Books that have been used by patients having infectious diseases might very properly be sent to the particular ward of an infectious disease hospital in which the disease is isolated, and so afford a basis for a library in infectious disease wards.

The most practical method for general book disinfection is the Beebe carbogasoline method. This consists in using gas machine gasoline and 2 per cent. phenol crystals. This is used by placing the books in the mixture after which they are removed and placed before an electric fan for two minutes, and then set on end for from twenty-eight to forty-eight hours.

A NEW REACTION FOR DIFFERENTIATING SCARLET FEVER AND SIMILAR ERUPTIONS. Umber¹ believes that he has found a valuable method of differentiating between the rash of scarlet fever and the rashes similar in appearance due to other causes. The reaction he uses is that suggested by Ehrlich, under the name of paradimethylamidobenzaldehyde reaction. Umber found it positive in 93 cases out of 96 in scarlet fever, and in 60 cases of rashes which were not scarlet fever, the reaction was negative in 59 and doubtful in one.

The reaction is found in freshly passed urine. The reagent for it is made by titrating in a mortar two grams of paradimethylamidobenzaldehyde with 30 grams of concentrated hydrochloric acid, and then diluting this mixture with 70 c.c. of water and filtering. Two drops of this reagent are added to the urine, and, on heating, and sometimes even when cold, one sees a red discoloration, and, if examined with the spectroscope, there is a color-absorption band between lines D and E of the spectrum. The reaction is also found in polyarticular rheumatism. It is due to the presence of urobilinogen in the urine. This observation is of considerable interest, as it is often extremely desirable to be able to make a rapid differentiation of skin rashes. It will, however, have to be confirmed by a much larger series of cases than Umber presents before it can be recommended for general use.

A NEW DIAGNOSTIC SIGN OF SCARLET FEVER. In 1911, Dohle, of Kiel,² described certain inclusion bodies in the leukocytes of scarlatinal

¹ Medizinische Klinik, February 25, 1912.

² Centralblatt f. Bacteriologie, November 23, 1911.

patients. He made a study of 30 cases, and in every case they were present in the polymorphonuclear leukocytes. He also examined a large number of controls, and found atypical forms in three. These inclusion bodies were not found after the sixth day, and Dohle believes that the bodies are pathognomonic of scarlet fever.

Kretschmer¹ confirmed the above observation, but thought the bodies might possibly be the result of streptococcus infection.

Nicoll and Williams² have made a study of these bodies and they have reported on a series of 51 patients, forty-five of which were positive, and six negative. The negative cases, however, were all examined after the sixth day. Most of their cases were examined within four days from the onset of the disease. They also examined 25 controls, which included normal persons and patients with measles, diphtheria, antitoxin rashes, erysipelas, tonsillitis, syphilis, and German measles. Three of these were positive; one, a complicated case of measles, one pneumonia in a syphilitic, and a case of erysipelas. The measles case was found, later on, to have had sore throat and a scarlatiniform rash, and probably was a case complicated with scarlet fever.

Ahmed³ reported finding the bodies in a number of fevers other than scarlet fever, so that further studies will have to be undertaken to determine the value of this method of diagnosis.

Kolmer⁴ has also made a study of these inclusion bodies, and he believes that they are closely related to the presence of streptococcus, as in 11 cases of erysipelas he found them present in 7, and he also found it in one case of puerperal sepsis. He states that they are present in polymorphonuclear leukocytes in 90 per cent. of scarlet fever cases in the first three days after the onset of the disease. He also found them in diphtheria in 42 per cent. of the cases, also during the first three days, but rarely after. The presence of these bodies is rather of limited diagnostic value, but, in the cases where it is a question of differential diagnosis between German measles and scarlet fever, or of the gastro-intestinal rashes, they may be found of considerable value. The method consists in making several blood smears in the usual manner; these may be stained either with Manson's method or with Giemsa's stain. Manson's method consists of fixing the blood in methyl alcohol and, after washing, stain one-half minute in a solution consisting of 1 gram of Koch's methylene blue to 50 c.c. of 5 per cent. borax solution. The nuclei of the cells take on a deep blue, the cytoplasm a very faint blue, and the inclusion bodies are stained a shade about half-way between these two. The masses vary in size

¹ Berliner klinische Wochenschrift, March 11, 1912.

² Archives of Pediatrics, May, 1912.

³ Berliner klinische Wochenschrift, June 24, 1912.

⁴ American Journal of Diseases of Children, July, 1912, p. 1.

and shape from that of a small coccus, to large, irregular masses one-fifth the size of a red blood corpuscle.

THE TREATMENT OF SCARLET FEVER WITH OIL OF EUCALYPTUS. For several years there have been reports concerning the treatment of scarlet fever by means of inunctions of oil of eucalyptus given over the entire body twice daily for the first four days, and once a day for the next six days.

Koerber observed an epidemic in which he treated 151 cases by this method, and 274 by the ordinary method. The cases treated with the oil of eucalyptus showed a mortality of 2 per cent., and the others a mortality of 2.56 per cent. There were, however, fewer complications in the cases treated than in the others, and this included otitis, nephritis, and the other things so frequently noted in the course of the disease. The rationale of this method of treatment is not clear, and it should be classed with the other indefinite methods that have been suggested from time to time.

SCARLET FEVER IN THE ETIOLOGY OF NERVOUS DISEASES. Neurath¹ has made a study of the post scarlet fever nervous diseases, and finds that these complications are about as liable to occur during the critical period as lesions of the other organs. Meningitis is perhaps the most common, and may be seen at the beginning of scarlet fever, or may be an extension from an otitis. Less rarely, hemiplegia may be noted, and this usually comes on about the beginning of convalescence, less commonly at the beginning of the disease; it is usually permanent, and is sometimes followed by athetosis. In addition to the above epilepsy occasionally dates from an attack of scarlet fever, and psychoses are also occasionally met with.

Septic Sore Throat. There have been a number of epidemics of what the English writers have termed septic sore throat, which have been reported in medical literature, and, while most of these were noted in England, there have been a number in various places in continental Europe. One of the most notable was an epidemic which occurred at Christiana. The increase is a very important one in its relation to the public health. As it seems to be more or less closely associated with a contaminated milk supply, the epidemics are liable to affect a rather large number of people, serving not only to incapacitate them during the time of their illness but it also leaves them with some more or less permanent reminder of their attack. The mortality is varied in different epidemics, but, as a rule, it is rather high. The disease, if it occurred in America before 1911, apparently escaped description, although it is quite possible that under some misleading name, reports may exist in the American journals. In May, 1911, there was an outbreak in eastern Massachusetts which has been reported

¹ La Semaine Médicale, December 13, 1911, p. 600.

by Winslow,¹ Richardson,² Darling,³ and Goodale.⁴ The following winter there were a number of outbreaks in various parts of the United States, two of which had been studied more or less thoroughly. One of these which occurred in Baltimore, has been reported by me,⁵ by Hamburger,⁶ Frost,⁷ by Luetscher,⁸ and Hirschberg.⁹ In Chicago there was another outbreak reported by Kapps,¹⁰ Heinemann,¹¹ and Davis and Rosenow.¹² These epidemics all presented about the same clinical features, were all accompanied by a rather high mortality and by numerous complications. In Boston, most of the cases attacked adults. In Baltimore, children, particularly those aged under four years, suffered more than anyone else.

The disease is associated with the presence of various bacteria and the reports are not entirely in accord. Hirschberg believes that the pneumococcus was responsible for the Baltimore outbreak. Most of the other observers found a hemolytic streptococcus which, from the standpoint of bacteriology, seemed to occupy a place between the *Streptococcus mucosus* and the ordinary hemolytic streptococcus. Without entering into the discussion of the technique side of this question, it may be stated that from the throats, from the pus, and, in fatal cases, from the blood, there could be uniformly found a streptococcus which, in the preparations directly from the body, presented the appearance of the diplococcus, occasionally in very short chains. In cultures, the streptococcus arrangement predominated. The bacteriology of this disease may be regarded as a question to be settled by further study. It would seem that the organism alluded to above was the causative agent, but it is possible that it may be a very constant accompaniment, just as we have the streptococcus as a constant feature in scarlet fever.

The relation of the disease to the milk supply is very striking. In all three cities a very large number of the patients were taking milk from one dairy, and there were usually a number of cases in each household. It seems quite probable that, once the disease is started in human beings, it may be transmitted by direct contact, as a number of nurses, who were very closely associated with the cases became ill of the disease.

¹ Boston Medical and Surgical Journal, December 14, 1911, p. 899; Journal of Infectious Diseases, January, 1912, p. 73.

² Boston Medical and Surgical Journal, December 14, 1911, p. 907.

³ *Ibid.*, 1911, p. 904.

⁴ *Ibid.*, p. 908.

⁵ American Journal of Diseases of Children, November, 1912.

⁶ Journal of the American Medical Association, April 13, 1912, p. 1109.

⁷ Public Health Reports, November 22, 1912, p. 1898.

⁸ Journal of the American Medical Association, September 14, 1912, p. 869.

⁹ *Ibid.*, April 20, 1912, p. 1189.

¹⁰ *Ibid.*, November 9, 1912, p. 1715.

¹¹ *Ibid.*, August 31, 1912, p. 716.

¹² *Ibid.*, March 16, 1912, p. 773.

There has been some discussion regarding this question of milk, but it would seem to me that there can be no question of the close relation to it. In the epidemic occurring in Massachusetts, which occurred in Cambridge, Boston, and Brookline, the milk came from one of the best dairies in New England. In this dairy everything had been done to exclude contagion and the whole work of producing the milk was carried out under the direction of a trained sanitarian. In spite of this, the epidemic occurred. In Chicago, a large proportion of the cases were traced to one dairy, and the same is true of the Baltimore epidemic. In Baltimore, the epidemic stopped rather promptly when the people were advised to boil their milk, and when the dairy in question had installed a satisfactory pasteurizer. The dairy in question had been pasteurizing milk, but, owing to some changes, this had not been done for several weeks.

The clinical picture of the disease is rather striking, and, while it has been described under the name of tonsillitis, it differs from ordinary tonsillitis in a number of ways. In some cases the appearance of the throat is that of ordinary tonsillitis; in others, there is a membrane somewhat suggesting diphtheria, while still others were characterized only by diffuse redness. Following this primary lesion, there is, in many cases, involvement of the lymph nodes of the neck which may be followed by deep abscesses. Serious complications are frequent, among which may be mentioned septicemia, arthritis, erysipelas, and nephritis. The disease is a very serious one, and the mortality rather high, particularly among the aged and infirm. A friend, writing to Professor Sedgwick from Cambridge, gives the following graphic description of the effect on the community: "The death of Mrs. X. seems the very culmination of this tragic season. Cambridge is like a city of the plague. Whoever one meets the talk is all of who is ill, who has had a relapse, who has died. The diagnosis of it is ill. It is not tonsillitis but a most malignant poison, issuing now in erysipelas, now in abscesses, now in rheumatism, now in neuritis, sometimes fatal in three days. All the principal doctors here are now convinced that it comes through milk."

The *treatment* of the disease is, on the whole, rather unsatisfactory. The patient should be isolated and kept in bed, and the general measures ordinarily employed for combating fever, pain, and the like, employed. Any collections of pus should be evacuated promptly, and local applications may be used on the inflamed mucous membranes. Weak protargol solutions (0.5 or 1 per cent.) applied rather frequently may be used, or diluted peroxide of hydrogen, or some of the other ordinary antiseptic solutions of known value may be applied. Care should be taken not to cause an increased amount of irritation. The inflamed lymph nodes are best treated by applying ointments containing ichthyol, or by using diluted solutions of subacetate of lead. They should not

be incised unless suppuration is very apparent. The internal administration of antiseptic drugs is apparently useless. Hexamethylenamin, given in large doses, does not seem to have any direct influence upon limiting the infection. Salicyl derivatives lessen the pain and discomfort somewhat, but do not exert any satisfactory action, nor can such action be obtained by any of the other drugs commonly administered in somewhat similar infections. The prophylaxis of the disease depends partly on the isolation of the cases and, perhaps more important than anything else, investigation of the milk supply, and the use of pasteurized milk. The Baltimore epidemic stopped promptly when people were advised to boil their milk. It is quite possible, however, that at times many cases occur from direct contact.

Smallpox. THE PREVALENCE OF SMALLPOX IN THE UNITED STATES. Trask¹ has reviewed the smallpox situation for the year 1911. Curiously enough, for the last fourteen or fifteen years the disease has been for the most part very mild, so much so that there has often been difficulty in making the diagnosis. This mild form of smallpox has also been noted in certain parts of Brazil, in South Africa, and in the West Indies. Such epidemics of mild smallpox have been noted from time to time in previous years, and the reason for it is not understood at the present time. The disease has not been altogether of the mild variety, as there have been a few outbreaks of considerable virulence. In Texas, in Kansas, and in a few other States, there have been small epidemics, many cases of which were confluent and some hemorrhagic.

IODINE IN THE TREATMENT OF SMALLPOX. Some years ago Welch and Schamberg called attention to the fact that external applications of iodine, particularly over smallpox pustules, were the best treatment out of all the different methods that they had tried. Rockhill² has tried the use of 10 per cent. iodine and 90 per cent. glycerin; this is painted over the pustules two or three times a day; the results were, the drying of the pustules, the absorption of the toxin, and the arrest of the destruction of the tissue. The amount of scarring is very much lessened, and the stay in the hospital is also shortened. On the face, the pustules may be opened with a sterile lancet and then touched with the tincture of iodine. Eighty-five patients were treated by this method with no deaths, and an average stay in the hospital of twelve days. It is quite probable that this epidemic was a mild one, and that, in severe cases, the stay in the hospital would not be as short, nor the results so satisfactory from the standpoint of mortality.

A New Species of Spirocheta. With the increase of our knowledge of spirocheta, many new organisms belonging to this class will doubtless be discovered.

¹ Public Health Reports, September 20, 1912, p. 1556.

² Journal of the American Medical Association, January 27, 1912, p. 273.

Noguchi¹ has described a new form which he has found in pyorrhea alveolaris. This organism produces mucin; it has been obtained in pure culture, and Noguchi suggests the name of *Triponema mucosum*. If does not differ much morphologically from the *pallidum* and the *microdentum*, but it may be easily differentiated through its biological properties and animal reactions. The strong fetid odor, in patients suffering from pyorrhea alveolaris, is due, at least in part, to the presence of this parasite in the affected tissue. Various other similar organisms have been described by other authors, and it was supposed that each one of them was responsible for the fetid odor but this could not be determined until very recently as it was not possible heretofore to cultivate this form of organism.

THE PURE CULTIVATION OF SPIROCHETA. While it is a matter of almost strictly laboratory interest, it is important to know that Noguchi² has been able to cultivate a number of the different organisms belonging to this class by the use of special methods which he fully describes. There are quite a number of spirocheta which are pathogenic. Obermeier, in 1873, first described the one which bears his name, which causes relapsing fever. In 1904, Ross and Milne, and simultaneously Dutton and Todd, described the *Spirochaeta duttoni* which causes African tick fever. The following year, Koch described another species in Africa which is now called after his name, and Norris, in 1906, described the *Spirochaeta novyi*.

Without going into details, it may be stated that these various forms reach their microscopic growth after seven, eight, or nine days at 37° C. They require the presence of a fresh, sterile tissue, and a body fluid capable of forming a loose fibrin with the tissue, otherwise they will not multiply. A certain amount of oxygen seems to be indispensable for their growth. The cultures may be transferred from one to another and the pathogenicity of these organisms is not lost by cultivation, although there is a tendency for them to become attenuated after a long time.

Noguchi³ has also described a method for growing the *Treponema pallidum* which causes syphilis. Other forms of treponema may be grown by the same method. His method is based upon the principle of superimposing a favorable culture medium upon a less favorable one, and he uses special apparatus, in which the tissue at the bottom of the tube, covered by a fluid medium, is superimposed by another tube connected with it containing tissue at the bottom of it, and a solid medium above. The cultivation of these organisms is an important step in the study of infectious diseases, as it permits of the separation of species supposed to be identical. Each time an organism is cultivated by a new method, it brings us one step nearer to solving the problem

¹ Journal of Experimental Medicine, August 1, 1912, p. 194.

² Ibid., p. 199.

³ Ibid., p. 211.

of the diseases which are caused by parasites which we are as yet unable to grow, and possibly to finding those which heretofore have evaded the most careful investigations.

Sporotrichosis in Man. This subject has attracted more and more attention, and quite a large number of cases have been on record, and I have noted, in *PROGRESSIVE MEDICINE* from time to time, certain features of this form of infection. Hamburger¹ has reported a case of his own and collected, in all, 28 undoubted cases that have occurred in America, and notes the fact that a great many more cases have been reported in Europe than in this country. The geographical distribution is quite interesting, and is as follows: North Dakota, 22 cases; Kansas, 13; Nebraska, 5; Illinois, 2; Missouri, 3; New York, 2; Minnesota, 2; California, 1; Iowa, 1; Indiana, 1; New Jersey, 1; South Dakota, 3; Montana, 1; Wisconsin, 1; total, 58 cases. Most of the cases noted come from North Dakota. Of the 13 cases reported in Kansas, 12 were reported in the twelve months immediately following the report of the first Kansas case by Sutton. Including cases in which the diagnosis was made on clinical findings, there were 58 cases, which certainly does not represent anything like the number of cases which have been observed, as many instances do not find their way into the medical journals. Thirty-two cases occurred in males and 21 in females, and the ages vary from three to seventy years. The majority of cases occurred between the ages of fifteen and forty-five. The infection seems to be rather more common in farmers and those working in the country, and the primary infection is liable to be upon the hands or some exposed part. In a few cases, there is a history of trauma, and, in the American cases, the duration of the disease is from three weeks to eighteen months. Beurmann describes the clinical varieties of the disease under four headings. (1) Localized sporotrichosis with an initial lesion followed by involvement of the lymph vessels and nodes. (2) Disseminated gummatous sporotrichosis, characterized by multiple nodules distributed without systematic arrangement throughout the body. These begin as small, hard, painless, round masses which do not ulcerate but which later on often give rise to cold abscesses. (3) Disseminated sporotrichosis, characterized by multiple ulcerations sometimes suggestive of furunculosis, at other times suggestive of tuberculosis, of syphilis, or combinations of these. (4) Extracutaneous sporotrichosis, with localization on the mucous membranes, muscles, bones, joints, ocular tissues, lungs, etc. Clinically, one may suspect sporotrichosis when any of the above lesions are found, especially when it occurs in individuals handling fruit or vegetables with the history of an injury and a gradual, slowly progressing onset, with an infection following the course of the deep lymphatics. Of special interest is the fact that the long-continued course of the disease does not

¹ Journal of the American Medical Association, November 2, 1912, p. 1590.

affect the general health as a rule, and there is little, or no, pain, and usually no temperature. There is a local and general eosinophilia, but the final diagnosis rests upon the cultivation of the organism. It grows readily on 2 per cent. glucose-agar at a room, or incubation, temperature. The *treatment* consists in the administration of potassium iodide in increasing doses, and the use of a weak iodine solution locally, consisting of one part iodine, one part iodide of potassium, 5 parts of water. The ulcerations may be painted with tincture of iodine, and the treatment should be continued until the patient is entirely cured, otherwise relapses are almost certain to happen.

Fourth of July Tetanus. The American Medical Association¹ has published the tenth annual summary of Fourth of July injuries. The diminution in tetanus has been quite remarkable, only 7 cases being reported, as compared with 18 last year, 72 in 1910, 150 in 1909, and 392 cases in 1903. The patients range from eight to fifteen years, and, in 5 cases, the injury was on the hand and on the other two it was on the leg. All 7 cases were caused by injuries due to blank cartridges, and 6 of the 7 cases were fatal. It has been determined that this diminution is not due to any reduction in virulence or occurrence of the tetanus bacillus, as the cases of tetanus due to other causes were not reduced during the Fourth of July season. In addition to the deaths due to tetanus, 35 persons were killed by various forms of fireworks, making a total of 41 deaths due to Fourth of July celebrations. This is 16 less than last year, and the lowest number during the ten years covered by the *Journal* statistics. It is the duty of the city authorities to pass prohibitive ordinances, and to see that they are enforced. The results, in such cities as Baltimore, Washington, Cleveland, and other places, show what can be accomplished in this direction.

PROPHYLAXIS OF TETANUS. This very important subject has received more attention of recent years, and a very interesting account of the subject, as it may be handled in a large general hospital, will be found in the report of Berghausen and Howard.² In the Cincinnati hospital, the following instructions were placed in each surgical ward:

The internes will please carry out the instructions mentioned below for the following classes of cases.

1. All perforating, penetrating, or lacerating wounds contaminated directly by soil or manure, especially those contracted in the streets or about stables.

2. All blank cartridge and giant cracker perforating and lacerating wounds.

The following tables show the distribution of the tetanus cases for the past ten years and their causes.

¹ Journal of the American Medical Association, September 7, 1912.

² Ibid., January 13, 1912, p. 104.

TETANUS CASES BY STATES

Comparison with Previous Years

	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.
Alabama . . . . .	..	..	1	..	..	..	..	..	..	..
Arizona . . . . .	..	..	..	..	1	..	..	..	..	..
California	2	4	4	3	1	..	2	1	2	1
Colorado	4	..	1	..	..	..	..	..	..	..
Connecticut	3	..	3	..	4	1	..	..	..	..
Delaware . . . . .	..	..	1	1	1	..	2	..	..	..
Dist. of Columbia	1	..	..	..	..	..	..	..	..	..
Florida . . . . .	..	..	..	..	..	..	1	..	..	..
Georgia . . . . .	..	..	..	..	1	..	..	..	..	..
Idaho	1	..	..	..	..	..	1	..	..	..
Illinois	49	15	20	16	12	12	20	10	3	..
Indiana	11	6	3	8	2	..	9	6	..	1
Iowa	14	2	3	4	4	1	1	1	1	..
Kansas	11	1	..	..	2	1	6	..	..	..
Kentucky	4	2	..	1	..	1	1	..	..	..
Louisiana . . . . .	..	..	..	..	..	..	..	..	..	..
Maine	2	4	1	1	..	1	1	1	..	..
Maryland	1	..	1	1	..	..	2	2	..	..
Massachusetts	16	5	7	3	2	5	8	..	..	..
Michigan	29	7	9	4	4	2	11	11	2	1
Minnesota	15	2	2	2	2	..	..	..	..	..
Missouri	29	1	3	3	1	5	8	2	..	..
Montana	2	1	1	..	1	..	3	2	..	..
Nebraska	4	3	3	1	..	1	3	1	..	..
New Hampshire	2	..	..	1	..	..	1	..	..	..
New Jersey	8	9	3	10	8	10	19	9	2	..
New York	36	9	6	8	4	9	11	7	1	..
North Dakota . . . . .	..	..	..	..	..	..	..	..	..	..
Ohio	67	9	5	7	6	7	12	3	3	..
Oklahoma	1	..	1	1	..	1	..	1	..	1
Oregon	2	..	..	1	1	1	..	..	..	..
Pennsylvania	82	17	12	5	7	7	10	11	1	..
Rhode Island	3	..	..	1	..	..	..	..	..	..
South Carolina . . . . .	..	..	..	..	..	..	..	..	..	..
South Dakota . . . . .	..	..	..	..	..	1	1	..	..	..
Tennessee . . . . .	..	..	..	..	2	..	..	..	..	..
Texas . . . . .	..	..	..	..	..	..	..	..	..	..
Utah . . . . .	..	1	1	..	..	..	..	1	..	..
Vermont	3	2	..	2	2	..	..	..	..	..
Washington	2	2	..	..	2	4	4	1	..	..
West Virginia	3	..	..	2	..	1	4	..	..	2
Wisconsin	10	4	13	2	3	5	9	3	2	..
Wyoming . . . . .	..	..	..	1	..	..	..	..	..	..
Total	415	105	104	89	73	76	150	72	18	7
States having cases	30	21	23	25	23	20	25	18	10	6

CAUSES OF TETANUS CASES

Year.	Blank cartridge.	Giant cracker.	Cannon.	Firearms.	Powder, etc.	Total.
1903	363	17	5	3	27	415
1904	74	18	5	1	7	105
1905	65	17	4	5	13	104
1906	54	17	1	7	10	89
1907	52	8	6	4	3	73
1908	58	5	4	3	6	76
1909	130	9	1	4	6	150
1910	64	2	..	5	1	72
1911	15	1	1	..	1	18
1912	7	..	..	..	..	7

Instructions.

1. In all cases above mentioned remove the clothing and foreign material about the wound.

2. Cleanse the surrounding parts with green soap, alcohol, ether, and sterile water.

3. Remove with sterile forceps any foreign material lying superficially in the wound.

4. Cleanse the wound with 5 per cent. phenol (carbolic acid), 0.5 per cent. hydrochloric acid solution.

5. Enlarge the opening by free incision if necessary to thoroughly cleanse the wound, or for the removal of foreign substance.

6. Use a general anesthetic whenever indicated.

7. Pack the wound lightly with gauze soaked in the phenol-hydrochloric acid solution, and dress. Change the dressings daily.

8. Immediately after dressing the wound on the first day give 1500 units of antitetanic serum subcutaneously. This serum can be obtained at the laboratory.

9. A careful record must be kept and sent to the laboratory when the patient is discharged.

10. In the case of doubt or on the appearance of symptoms resembling tetanus, notify me (Berghausen) at once.

In 96 cases so handled, consisting chiefly of punctured wounds made mostly by nails, but also including some blank cartridge and gunshot wounds, and other similar injuries, not a single case of tetanus occurred. In 14 cases treated without the administration of antitetanic serum, 8 patients developed tetanus, 6 of whom died; the remaining 6 cases had received proper local treatment and did not develop the disease. It would seem from these results, which are very much the same as have been obtained in other places in a scattered practice, that in every case in which the wound is of such a character as to lead one to fear the development of tetanus, in addition to the careful local treatment the prophylactic dose of antitetanic serum should be

administered, and this should be repeated at the end of a week in case suppuration has not ceased. When this plan is followed, it would seem that tetanus may be avoided altogether. It seems quite probable that almost all tetanus could be avoided by proper local treatment, but anyone who has had much experience with accident cases in a general hospital will realize that many patients will not submit to what must seem to them unnecessary interference in the treatment of punctured wounds.

THE CARBOLIC ACID TREATMENT OF TETANUS. In previous numbers of *PROGRESSIVE MEDICINE* I have noted the use of carbolic acid in the treatment of tetanus, as first suggested by Bacelli. The results are perhaps more satisfactory than in any other method of treatment. Kintzing¹ has reported 7 cases, 4 adults and 3 children, all of which recovered. Only one was seen before the onset of convulsions, and 2 were not seen until convulsions had been present over forty-eight hours. The phenol is used in a 10 per cent. solution in sterile water; the full adult dose was 10 drops of this 10 per cent. solution, equal to about 1 grain of pure crystalline phenol. This was usually administered in two doses, 5 drops being diluted with 25 to 30 minims of water, and both doses being given at the same treatment. The entire 10 minims diluted to about 40 minims, may be given in one injection, however, and Kintzing has not observed any bad results from this procedure. The injections should be made deep into the muscles, and may be repeated at intervals of three hours, increasing the interval as improvement takes place. The urine should be carefully watched and if it becomes very dark in color the drug should be stopped, at least temporarily. Kintzing was not obliged to stop using the drug in any of his cases. Sedatives were also used at the same time, but small doses sufficed to render the patient comfortable. Kintzing is of the opinion that the same method of treatment may be useful in some forms of meningitis, and possibly in cases of acute rheumatic fever.

CEPHALIC TETANUS. Brown² has reported one instance of what is usually known as cephalic tetanus, a term which is applied to cases which present a paralysis of one or more of the cranial nerves as a prominent symptom, together with more or less marked symptoms of tetanus generally confined to the region of the head and neck, though at times involving the entire body. Some authors have used this term to cover all cases of tetanus in which the wound of entry was on the head, but this is an incorrect use of the term.

Bell, as early as 1830, is said to have described the condition, and since his time a number of cases have found their way into medical literature. In 1895, Willard³ was able to collect 74 cases, and he added one of his

¹ New York Medical Journal, December 23, 1911.

² Annals of Surgery, April, 1912.

³ Transactions of the College of Physicians, Philadelphia, 1895, p. 27.

own making 75. Ross¹ made analysis of 81 cases and since that time Brown has been able to find 12 cases and one of his own, making a total of 94 cases.

In 84 per cent. the first sign of the disease has been trismus, either alone or accompanied by paralysis of one or more of the cranial nerves. As a rule, the paralysis follows the trismus. In 14 cases, however, including the case reported by Brown, the paralysis preceded the trismus. Ross thought that the appearance of the paralysis as the first symptom meant an almost invariable fatal termination, but this is not so, as 5 of the 14 cases reported have recovered showing, however, a mortality of 64.02 per cent. as contrasted with the mortality of 53.02 per cent. for cephalic tetanus as a whole. Observations have been too few to make rules, but it seems as though the facial nerve is most frequently involved, and the oculomotor, abducens, trochlear, and hypoglossal in the order named. The paralysis is most apt to appear on the side of the lesion and in some cases is bilateral. In most of the bilateral cases, the wound has been across the median line of the head usually across the bridge of the nose, but there have been wounds crossing the median line which have not given rise to bilateral paralysis. When the wound involves the orbit, one or more of the muscles of the eye may be paralyzed. Ptosis has been noted in 8 cases, strabismus in 4, nystagmus in 1, and fixed dilatation of the pupil has also been described. In all but 2 cases, the wound has been on the head or face, but there is one instance of cephalic tetanus following a wound on the foot, and one in which it was supposed that the wound entered the finger nail. There can be no doubt about the tetanus bacillus being the cause of this condition, as cultures have been obtained from the wound in quite a number of the cases. The prognosis varies, the shorter the period of incubation the more dangerous the disease, and, if the spasms remain localized in the muscles of mastication and deglutition, the prognosis is good, regardless of the length of the incubation period. If the spasms become generalized, the prognosis is almost invariably hopeless.

THE IMPORTANCE OF PURE ANTITETANIC SERUM. Houzel and Rançon² have reported a case which illustrates very well the necessity of using serums of an undoubted purity. The patient was a man, aged thirty-eight years, who had sustained a slight injury on the right knee, and, to avoid the development of tetanus, he was given 10 c.c. of antitetanic serum. Either the serum was insufficiently corked, or an insufficient amount of antiseptic had been added. The injection was given under the skin of the abdomen after sterilizing first with alcohol and then with iodine. The next day there was a slight inflammatory reaction about the site of injection, and on the next day there was

¹ Edinburgh Medical Journal, 1906, vol. xix, p. 229.

² Gazette des Hôpitaux, July 16, 1912, p. 1175.

considerable swelling about the abdomen and a rise of temperature. Following this, there was a septicemia, with involvement of the lungs, the heart, and the kidneys, and a diffuse phlegmon developed at the seat of the injection. Unfortunately, the patient finally died of septicemia. Accidents such as these will doubtless recur from time to time, but much can be done to prevent them by using serum of known purity and that which is dated, taking care not to use serum which has been kept for too long a period or which presents any unusual cloudiness, or evidence of any other change.

The Prowazek Bodies as a Diagnostic Criterion and Measure of Infectivity in Trachoma. Gurley and Chase¹ have made a study of this subject which is of particular interest to those who have to deal with trachoma cases, particularly immigrant inspectors and those working in schools in large cities.

Halberstaedter and Prowazek found, in human trachoma and also in experimental trachoma in the orang-outang, inclusions in the conjunctival cells. In smears, the epithelial cells showed, near the nucleus, dark blue, irregular, small, round, or oval inclusions. These were described at almost the same time by other observers, and they have been regarded by some as parasites. These bodies are studied by taking a scraping of the conjunctiva with a small sharp ophthalmological spoon using, if necessary, a cocaine solution as an anesthetic. The scraping is transferred to a slide, and smeared out by laying a second slide upon the first and then drawing the upper slide in such a manner as to make a smooth smear. These are hardened for from ten seconds to a minute in either absolute alcohol, or equal parts of absolute alcohol and ether, or methyl alcohol. They may be stained by Giemsa's method. The authors cited believe that, for diagnostic purposes in schools and under other conditions, the presence or absence of these bodies will be found to be a diagnostic criterion of great value. This method of detecting the disease is particularly useful in postoperative cases in which the diagnosis is obscure because of lesions which may be the result of the operation. The cases, in which these bodies are present, seem, in certain instances, to have a rather high degree of infectivity. With such cases, therefore, special precautions should be taken to prevent the infection of others. They suggest the advisability of microscopic examination for these bodies in all cases of acute inflammation of the conjunctiva which last longer than the ordinary cases of acute catarrhal conjunctivitis; also in cases in which the diagnosis of trachoma has been made in which there are inflammatory symptoms, and, furthermore, in the border-line cases in which the diagnosis is doubtful, especially those in which operations have been performed.

¹ Studies from the Research Laboratory, Department of Health, New York City, p. 267.

The Occurrence of *Trichomonas Hominis* in the Gastric Contents.

Smithies¹ has completed an interesting article which will do much to stimulate the study of the occurrence of ameba and the flagellate protozoa. It was formerly thought that these organisms were rarely found in the feces of individuals who had never visited the tropics. This has been shown to be an error, and it is quite curious that these organisms have not been sought for in other locations outside of the intestine. There have been a number of observations made showing that the trichomonas hominis were sometimes present in the gastric contents.

Skallar, in 1898, reported two instances of carcinoma at the cardiac end of the stomach in which flagellate organisms were found. Cohnheim, in 1901, found the organism in the test meal from a case which was clinically called gastritis. A number of similar observations have been made, all from continental Europe.

Sistrunk last year called attention to the great frequency of trichomonads in the stools of persons living in the north of the United States and, in this connection, Smithies' report is of particular interest. Both his patients were women who had resided in semitropical climates. Both had been weakened by illness and loss of blood incident to surgical procedures, and both had been accustomed to taking unboiled water from the surface wells. Contrary to what might have been expected, neither patients had any diarrhea. The symptoms present were referable to the gastro-intestinal tract, consisting of nausea, flatulence, abdominal distention, colicky pains and constipation. In addition, there were headaches, neuralgia, and exhaustion. There was a slight amount of anemia, and an increase in eosinophiles. The test meal showed a lowered total, and free hydrochloric acid, as well as increased amounts of mucus containing large numbers of bacteria and trichomonads.

The treatment for infections of this kind consists of lavage of the stomach, administration of calomel and a saline, or a saline alone, and the administration of thymol. The results of treatment are, as a rule, perfectly satisfactory.

Tuberculosis. THE RELATIVE PREVALENCE OF HUMAN AND BOVINE TYPES OF TUBERCLE BACILLI IN BONE AND JOINT TUBERCULOSIS OCCURRING IN CHILDREN. Fraser² has contributed a study on this subject, using as material children from Edinburgh and its neighborhood. There has been a great deal of work done on the subject of human and bovine tubercle bacilli, and a great many different opinions have been advanced, many of which were undoubtedly influenced by the previous ideas entertained by the authors. Without taking up the details of Fraser's work, he seems to prove rather conclusively that

¹ American Journal of the Medical Sciences, July 12, 1912, p. 82.

² Journal of Experimental Medicine, October, 1912, p. 432.

in cases of bone and joint tuberculosis occurring in children in and about Edinburgh most of those in which there is no history of tuberculosis in the family, which means usually no history of direct exposure, are due to the bovine type of bacilli. On the other hand, where there is a history of tuberculosis in the family, 71 per cent. of Fraser's cases were due to the bacillus of human tuberculosis. These results differ somewhat from those of previous observers.

The British Royal Commission investigated 14 cases, 13 of which were due to the human bacillus, and the last contained both human and bovine bacilli. The cases reported by Park and Krumwiede were all due to the human bacillus, and, in a series of 36 cases examined by Kussel, Weber, and Heuss, 12 cases in adults were all caused by the human bacillus. Twelve cases in children, aged from five to six years, were caused by the human bacillus with one exception, while 13 cases of children, aged under five years, were due to the human bacillus. In connection with Fraser's report, it would be exceedingly interesting to know something about the nature of the milk supply, as infection, in most of his cases, evidently was from milk. In all his cases, aged under one year, in which the bovine bacillus was found, all the children were nourished entirely upon cows' milk. In the cases ranging from one to two years of age, 8 out of 12 were due to the bovine bacillus, and every one of these had been nourished from birth upon cows' milk. In 2 cases, both human and bovine bacillus were found, and in each instance the child had been nourished upon cows' milk, and each showed a family history of pulmonary tuberculosis. These figures of Fraser's illustrate what one would expect to find, that is, that in children who are exposed to human tuberculosis, the large majority of cases would be found to be due to the human bacillus. Where there is no exposure, the chances are largely in favor of the tuberculosis being bovine in character, and that the milk supply is responsible. There are two very practical lessons to be learned from these studies, one is a point upon which I have frequently insisted, the great danger of direct infection from the tuberculous patient and that young children should be separated entirely from patients with tuberculosis. As everyone knows, a very large proportion of tuberculosis in children is due to direct infection, most of which is preventable. A second lesson, is that milk from sources of doubtful purity with reference to tuberculosis should be pasteurized before being used for infant food. This whole subject of human bovine tuberculosis should be kept investigated in different places, as undoubtedly in different localities the incidence of the bovine and human types will be found to vary.

THE CONTAGIOUSNESS OF THE SWEAT OF TUBERCULOUS INDIVIDUALS. Piéry¹ has made a study of this concerning which there have been but few observations made. Di Mattei, in 1888, collected the sweat from

¹ Gazette des Hôpitaux, March 28, 1911.

tuberculous patients and found tubercle bacilli in it. Following careful disinfection of the skin, he was not able to demonstrate the organisms. Surmont, about the same time, inoculated the sweat from 15 tuberculous patients into guinea-pigs, and all 15 guinea-pigs remained alive and well. He collected the sweat on cotton and it is possible that the organisms were retained in the cotton very much as they would be if it were used as a filter. In 1901, Poncet called attention to the danger of the infection of wounds through the sweat of the hand of the surgeon. Piéry made a series of observations, some on cases of pulmonary tuberculosis, where the discharge was from a tuberculous focus exposed to the air, and others on cases which might be regarded as closed cases, and found that, in both instances, there were some positive and some negative results. He found the same to be true of cases of surgical tuberculosis. He found in all slightly over 30 per cent. of the cases of surgical tuberculosis contained the tubercle bacilli, and a slightly higher proportion in cases of tuberculosis of the lung. In regard to the sweat as a possible means of contagion, which may explain, to a certain extent, some cases of conjugal tuberculosis, he recommends separate beds, and the disinfection of clothing and bed linen, and other objects which may be contaminated.

THE VARIATIONS IN TEMPERATURE IN THE DIAGNOSIS OF TUBERCULOSIS. Bertrand¹ has made a study of the variations in temperature, and has found that, normally, the variation is from 0.8 to 1° in the twenty-four hours, with variations during the day time of from 0.5 to 0.6°. These oscillations of temperature show a certain periodicity, the minimum being observed at about 2 in the morning in adults, and the maximum at about 10 o'clock in the morning and at 5 o'clock in the afternoon. In individuals in good health, the temperature does not vary much, even after marked physical exertion, but, in the tuberculous, exertion may cause a sudden rise of half a degree or more, with a return to normal after a half hour of rest. Various vasomotor disturbances may be noted at the same time. In doubtful cases of tuberculosis, careful investigation of temperature furnishes information of considerable value, and may be easily tested by periods of rest and exercise, and, in the suspected case, if the temperature remains normal and without variation after exercise, it is fairly safe to assume that the individual is not tuberculous. There is usually a wider temperature range in the tuberculous, which may be noted by taking the temperature every two or three hours during the twenty-four hours. It is a well-known fact that, in children with disturbances of almost any kind, exertion will cause a rise of temperature, hence this is not of as much value as in adults.

¹ Ann. de la Soc. royale des scienc. méd. et natur. de Bruxelles, 1911, xix, 5; La Semaine Médicale, February 14, 1912, p. 75.

UNEQUAL PUPILS AS AN EARLY SIGN IN PULMONARY TUBERCULOSIS. I have called attention before to this useful and easily noted phenomenon which is best observed in a moderately lighted room. Tuechter¹ has reported a series of cases which serve to illustrate that a pupillary difference, which is not caused by a pathological condition of the eye, is a very valuable early sign in pulmonary tuberculosis. It is valuable in the absence of other signs when they are present. It should be remembered that dilatation may be on the side of the lesion, or on the opposite side.

PEREZ'S SIGN IN TUBERCULOSIS. Ewart² has published an account and given a number of references relating to this sign, which consists in the production of sounds audible over the upper thoracic surface on actively or passively moving the arms at the shoulder point, and particularly on raising and lowering them. The first account was published in 1896, in the *British Medical Journal*, and led to studies of various sounds which could be heard upon moving the arms. Some of these sounds heard were caused by changes in the joints, some originated outside the joints, and others were related to the tendons. Attention has also been called to subscapular sounds. For pulmonary and pleural conditions, the joint sounds should be carefully excluded by first placing the stethoscope over the head of the humerus and then making a full range of passive movements. If this is negative, and the sounds are heard over the thorax, one can always suspect the presence of changes, particularly in the pleura, which are liable to be due to tuberculosis. The subscapular sounds may be noted in individuals who are not tuberculous and who apparently have no lung trouble, and should therefore not be regarded with the same seriousness as sounds heard elsewhere in the chest.

This ingenious method has not been studied sufficiently thoroughly to permit one to pass upon its value in physical diagnosis, but it is certainly of great interest, both from the standpoint of giving positive information in the case of pleural and pulmonary disease, and also in aiding us to exclude the sounds originating in or about the joints, which, in many instances, were formerly misinterpreted.

THE PROGNOSTIC IMPORTANCE OF THE TUBERCLE BACILLUS IN THE BLOOD IN THE COURSE OF PULMONARY TUBERCULOSIS. Hilgermann and Lossen³ have made a study of this subject by withdrawing 10 c.c. of blood from a vein, immediately mixing it with 20 c.c. of a 3 per cent. solution of acetic acid. This is allowed to stand for half an hour, and is then centrifugalized. The sediment is then mixed with 3 times its volume of antiformin, and the mixture placed in an incubator at 37° C. for several hours. This is again centrifugalized, the sediment washed

¹ Journal of the American Medical Association, February 24, 1912, p. 548.

² British Medical Journal, April 6, 1912, p. 771.

³ Deutsch. medizinische Wochenschrift, May 9, 1912, p. 895.

several times in sterile water, and then examined. In 64 cases, they found the bacillus in the blood 17 times. The presence of bacilli do not seem to have any relation to the attacks of fever, but the cases in which the bacillus was found in the blood did not do as well as the cases in which it was not found. They do not believe that this presence of the bacilli can be considered as the beginning of a miliary tuberculosis, as some of their cases have survived for more than a year, and some have had considerable improvement in the general condition. Three of the 17 patients died, one of whom succumbed to a tuberculous meningitis.

Typhoid Fever. THE TREATMENT OF TYPHOID BACILLUS CARRIERS WITH VACCINES. The typhoid carrier is a formidable problem, and any method which may be discovered that will free such individuals from typhoid organisms will be of the greatest possible benefit to humanity. Up to the present time, the various methods tried have either been failures, or only successful in a few cases. It has been suggested that these individuals be treated by repeated injections of typhoid bacilli, after the manner of the inoculations used for the production of immunity. Brem and Watson¹ have reported a case in which the only treatment was the use of autogenous vaccines; 9 doses were given, increasing from 25 to 1500 million. The bacilli decreased gradually, and disappeared after the ninth vaccination. The total duration of the bacilluria from the time of normal temperature was about six months, and during this period all the cultures were positive. Following the disappearance of the bacteria, subsequent cultures were negative, and they believe the cases to be permanently cured. They have briefly reviewed the literature up to the present time, and have found 11 other cases that have recovered after the use of vaccines; 5 of these were treated with autogenous vaccines.

TYPHOID CARRIER ON SHIPBOARD. Sawyer² has reported a very interesting study of a typhoid carrier who had typhoid in 1907, and since that time has served on 5 different ships, with the result that he caused 21 cases of typhoid, and 4 deaths. Most of these cases occurred on the steamship *Acme* on which the carrier served for three years and seven months, during which time the ship began to be regarded as a fever ship, and it was difficult to secure men to complete the crew. The cause of the typhoid was determined after a careful study, and it is of particular interest to note that the carrier in question was the winch driver, and had nothing to do with the preparation or serving of food. This is an important investigation, as we generally associate the danger of the typhoid fever carrier chiefly in his connection with food or drink.

THE DIAGNOSIS OF TYPHOID FEVER. It is curious how well-known phenomena concerning disease are described, from time to time, as

¹ Archives of Internal Medicine, November, 1911, p. 620.

² Journal of the American Medical Association, May 4, 1912, p. 1336.

something new and of particular value. I remember one of the first things shown me on a typhoid fever patient was the fibrillary contraction to be produced in the biceps muscle, or, in fact, any muscle, by flipping the muscle between the thumb and index finger. The ridge thus formed disappears slowly. This is not pathognomonic of typhoid fever but occurs in other diseases, particularly late in tuberculosis. Burke¹ has described this in a preliminary report on a new diagnostic reflex in typhoid fever. A point of interest in his report is a large series of cases other than typhoid in which he tried this test, and, almost without exception, it was absent, and in 260 cases of typhoid it was present. It is also interesting to note that, in 114 cases of appendicitis, the sign was absent in 111, and present in 3 and all of these 3 gave a Widal reaction. He believes that the sign is of considerable value, particularly in excluding typhoid if the sign is absent. It is to be hoped that, in his subsequent report, the time in typhoid in which this reflex appears will be noted.

OPHTHALMOREACTION IN TYPHOID FEVER. Following the announcement of Calmette concerning the ophthalmoreaction in tuberculosis, there were a great many investigations made, and the method is now in practical use, although many of us believe that, except in the hand of specially trained workers, it is best not used. Chantemesse was the first to attempt to apply a similar reaction in typhoid fever. In 1907, he published an account of his method. Following his observation, various observers have studied this subject, and among the more important contributions is that of Austrian.² The first thing he did was to attempt to find an antigen which would cause a reaction in all cases of typhoid fever. The method finally adopted was to inoculate flasks containing plain bouillon with 80 different strains of typhoid bacilli, and incubate these at 37.5° C. for twenty-four hours. The cultures are then centrifugalized, and the bacteria washed free from broth, suspended in sterile, distilled water, and heated for two hours at 60° C., after which the bacteria were dried *in vacuo*. When thoroughly dry, the mass was ground in an agate mortar with a small amount of sodium chloride for three hours. Distilled water was then added, drop by drop, the grinding continued, and sufficient water was added to make the proportion of 10 c.c. of water to each gram of bacilli. This was heated for two hours at 60° C., and subsequently for half an hour daily for three successive days, after which the supernatant fluid was slowly poured into 10 volumes of absolute alcohol, and the white flocculi which formed were again dried. This was finally ground to a powder, and the test solution made by dissolving 10 mg. in 1 c.c. of water. The powder is stable when kept in tightly sealed, dark containers and

¹ New York Medical Journal, December 16, 1911, p. 1223.

² Bulletin of the Johns Hopkins Hospital, January, 1912, p. 1.

remains active for months. Solutions in water lose their strength rapidly, and are often useless after three or four days.

The conjunctiva of the two eyes should be carefully examined for signs of inflammation. A drop of the test solution is instilled in the eye and allowed to run over the conjunctiva before the lid is closed. The patient should be cautioned not to rub the eye. Within one to five hours there is generally a moderate grade of injection of the palpable conjunctiva, reddening of the caruncle, lacrymation, and sometimes a drop of yellow pus. If the reaction is very marked, the ocular conjunctiva may also be suffused. It reaches its greatest intensity within from six to ten hours, and there may then be slight reddening of the skin and slight edema of the lids. The congestion begins to subside, but is usually still marked twenty-four hours later, and often longer. The patients do not complain of any pain or photophobia, although lacrymation and sticking together of the lids may cause a little discomfort.

It sometimes happens that normal individuals, or those suffering from other diseases, may give a reaction; in these cases, there is a greater degree of injection of the ocular conjunctiva and larger amounts of pus, and, what is of the greatest significance, a less constant developing of the reaction of the palpable conjunctivæ and caruncle. This latter fades rapidly in from four to fourteen hours. The most characteristic part of the positive reaction is the deep purple congestion of the palpebral conjunctiva of the lower lid and of the caruncle. Austrian states that, from his experience, which includes 190 tests made on normal individuals, or those suffering from diseases other than typhoid fever, and from 75 reactions made on cases with typhoid, the specific reaction can be differentiated rapidly. He claims that the advantage of the test is simplicity, and that it may be made out earlier than the Widal reaction, and that the results follow very closely those obtained from blood cultures.

A NEW TYPHOID FEVER TEST. Prendergast¹ has described a new test which he believes to be a sure means of making an early diagnosis. The test consists in the injection of a few drops of a suspension of dead typhoid bacilli of the strength of 5,000,000 per c.c. This may be easily made by diluting the suspension used for typhoid vaccination, 1 drop of the 1,000,000,000 suspension being added to 20 drops of sterile salt solution. A few drops of this is injected into the skin as superficially as possible. If the patient has not typhoid fever, in twenty-four hours there is a well-marked area of redness about the point of injection. The patient with typhoid fever shows no reaction. As a general rule, the reaction begins in twelve hours, increases until about twenty-four hours, and then diminishes and disappears entirely in forty-eight hours. If the redness persists after forty-eight hours, one

¹ Medical Record, December 30, 1911.

may suspect a skin infection, and the test should be repeated. Care should be taken to avoid infection. The skin should be thoroughly cleansed with alcohol. The solution should be fresh and sterile, and the hypodermic syringe and needle should be thoroughly sterilized. This gives no constitutional reaction and has no elements of danger. In the negative cases, a few patients have complained of slight soreness and itching at the point of injection, but this rarely gives any trouble. The author has used the test in 27 unselected cases. Just how early the reaction is noted, and how late, will have to be determined by future observations. If the patient has had typhoid, even some years previously it will be positive.

THE REACTIONS IN ANTITYPHOID VACCINATION. Albert and Mendenhall¹ have made a study of the reactions occurring after antityphoid vaccination. The local reaction is practically always present, and in some few cases there is a general reaction, although sufficient indisposition to cause the patient to go to bed is a very rare occurrence. The local reaction usually begins in four or five hours after the injection and gradually subsides, disappearing in from three to five days. In most cases, there is simply an area of redness about 10 cm. in diameter; this is slightly swollen and somewhat tender. Occasionally the axillary lymph nodes are slightly enlarged and somewhat tender. Systemic reactions vary considerably, and generally consist of temperature, which may go as high as 103° F., headache, malaise, insomnia, nausea, backache, vomiting, chills, herpes labialis, and sometimes there is albuminuria. These general symptoms come on five or six hours after the injection, and generally entirely disappear before the end of the first forty-eight hours. As a general rule, the reaction is less for each successive injection. Apparently those individuals who have had typhoid fever previously give a more severe reaction than those who have never been so affected. The leukocytes were also studied, and there was a marked increase in the polymorphonuclear neutrophils and the large mononuclears, a marked increase, both absolutely and relatively in the large mononuclear cells in the peripheral blood—the only leukocyte change which is common to both typhoid fever and antityphoid vaccination.

THE VACCINE TREATMENT OF TYPHOID FEVER. Callison² has contributed an interesting article on this subject, and he gives the details of 10 cases, in addition to those which he has already reported in other places. Of the value of typhoid vaccines in preventing the disease there can be no question. The dead bacilli produce a reaction on the living tissue of the individual, and it seems that this reaction may be obtained in individuals with typhoid just as well as in those without it. Theoretically, there will be an interval of from five to eleven days

¹ American Journal of the Medical Sciences, February, 1912, p. 232.

² Ibid., September, 1912, p. 350.

between the first inoculation and the production of antibodies in response to that injection. Following this, there should be a more rapid drop in the temperature curve when the protective substance produced by the inoculation are added to those produced by the infection already present. As a matter of fact, reaction occurs more quickly in individuals with typhoid than in those without it, so that the good effects of the injections are seen as a rule somewhat earlier than might be expected. The effect is to lower the temperature and to cause the patients to lose the typhoid appearance, become brighter, sleep better, and to be better in every way. Convalescence apparently takes place more quickly, and there is a lessened tendency to relapses and complications. The sooner the vaccines are used after the diagnosis has been made, the better the results will be. The contraindications have not as yet been worked out.

Callison¹ has published the bibliography of this subject with the summary of reported cases; the report last year included 223 cases, but at present there have been recorded a total of 475 cases. There have been 31 deaths, or 6.5 per cent., and 31 relapses, or 6.5 per cent., and these include some cases in which the dosage was too small. As to dosage, Callison suggests that an initial injection of 500,000,000, repeated at four day intervals as long as is required, and increasing the dose 100,000,000 at each injection. He prefers a stock vaccine, as it apparently causes less local reaction and is less toxic than an auto-genous vaccine. The vaccines are given the same way as those for prevention, and the local reaction is about the same, while the systemic reaction can be ignored.

VACCINATION WITH LIVING, SENSITIZED TYPHOID BACILLI IN TYPHOID FEVER. Working with chimpanzees, Metchnikoff and Besredka were able to produce immunity by means of inoculation with sensitized living typhoid bacilli. It was thought that similar results might be obtained in human beings, and Broughton-Alcock,² working in the Pasteur Institute, has obtained some interesting results. The method of using living bacteria for producing immunity was first suggested by Besredka. Sensitized cultures are obtained by mixing the cultures of the bacilli with antityphoid horse serum. Such cultures may be kept as long as four months without any particular precautions. The serum is removed by washing and the use of centrifuge, and the bacteria are then suspended in normal salt solution. The bacilli are allowed to grow on agar for twenty-four hours, and the growth is then washed off with 1 or 2 c.c. of normal salt solution, and to this 10 drops of antityphoid serum is added. The mixture is allowed to remain over night, and they are then separated. The bacteria from an ordinary slant is suspended in 100 c.c. of a normal salt solution, and from 1 to 1.5 c.c.

¹ Medical Record, 1911, lxxxix, 1129.

² Lancet, August 24, 1912.

of this is given as the first dose, and the second dose is given some eight days later at 2 to 3 c.c. The first dose contains from 500,000,000 to 750,000,000 bacilli, and the second double the amount. The chief advantage is that there is no general reaction, and but very slight local reaction. This method has been used already on about 750 persons, but there is no very accurate data available concerning the value of this method, which, so far, rests upon the experiments of Metchnikoff and Besredka.

TYPHOID HEMIPLEGIA. There have been comparatively few instances of this reported, although Gubler called attention to it as early as 1860. Williams¹ has made a study of this subject and has reported 4 cases; one of which proved fatal. A complete resumé of the literature on the subject up to 1907 may be found in an article by Smithies.² Hemiplegia is more apt to occur in males than in females, and, in 40 cases in which the sex is stated, 70 per cent. were in men. Forty-four per cent. were affected on the left side, and 56 per cent. on the right side. In 28 cases of right hemiplegia, aphasia was present in 82 per cent., while it is mentioned in only 18 per cent. of 17 cases in which the left side was affected. Athetosis has been noted in 4 cases. The symptoms and general appearance of typhoid hemiplegia do not differ materially from that from other causes, so that the diagnosis rarely presents any difficulties. The pathological condition, in most cases, is a thrombosis, but, in some instances in which autopsies have been made, embolism has been found to be the lesion present. It is quite possible that in some of the more transient and rapidly healing cases, in which there is a complete, or almost complete, recovery, this may be a very satisfactory explanation. One case has been reported in which it had been supposed that encephalitis was present.

VEGETABLES AS A POSSIBLE FACTOR IN THE DISSEMINATION OF TYPHOID FEVER. Creel³ has made a study of the possibility of typhoid being transmitted by vegetables. As early as 1901, Wurtz and Bourges demonstrated that plants could be contaminated by infected soil, and they recovered the typhoid bacillus from vegetables grown under such conditions up to three weeks after the soil had been infected. Other observers have found the typhoid bacillus in wet soil sixty-seven days after infection, and, where diluted sterile sewage was added, the period of the life of the typhoid bacillus was extended to seventy-four days. Creel demonstrated that plants cultivated in contaminated soil will take up on the leaves and stems, as they grow through the soil, the organisms existing therein. The typhoid bacillus was recovered from the tips of leaves which, to the naked eye were free from soil, although it is presumable that microscopic particles of earth were adherent

¹ American Journal of the Medical Sciences, May, 1912, p. 677.

² Journal of the American Medical Association, August 3, 1907.

³ Public Health Reports, February 9, 1912, p. 187.

to the leaves. He also demonstrated that rainfall will not free vegetables from infected material, and that, even under conditions most unfavorable to the life of the typhoid bacillus, infection lasted at least thirty-one days, a period sufficiently long for some varieties of lettuce and radishes to mature. The results of these experiments prove what was already assumed to be the truth, that such vegetables as lettuces, radishes, and celery, when grown in contaminated soil, may be responsible for the development of typhoid fever in individuals eating such vegetables; and also that the soil acts as a reservoir for bacteria, serving to maintain in streams an infection for much longer periods than if the infection of the stream were direct. Special attention should be called to the practice of using human excreta as fertilizer which, while it is not common as is generally supposed, is used all too frequently. It is quite probable that some of the outbreaks of typhoid fever, which are difficult to explain, have their origin in this source.

WATER SUPPLIES AND THE CONTROL OF TYPHOID FEVER. The amount of typhoid fever in the United States is so great, and we are all so accustomed to it, that it makes but faint impression on us. McLaughlin¹ has gathered together some figures which are well worthy of consideration. Combining the death rates per 100,000 of 33 of the principal European cities in Russia, Sweden, Norway, Austria-Hungary, Germany, Denmark, France, Belgium, Holland, England, Scotland, and Ireland, with an aggregate population of 31,500,000, we find an average of 6.5 deaths from typhoid fever. In 50 American cities of 100,000 inhabitants, or over, with an aggregate population of 20,250,000 there were 25 deaths per 100,000, showing an excess of deaths from typhoid fever in American cities of 18.5, or, in other words, in every 100,000 of our population, as compared with the results on European cities, 18.5 deaths and at least 180 cases which ought not to have occurred.

The smaller cities and villages have a much higher death rate from typhoid, so that, at a rough estimate, the number of cases which occur in the United States every year, and which could be avoided by the use of well known measures, reaches 175,000 and the preventable deaths about 16,200. We are accustomed to regard India as a plague-stricken country, and the mere mention of plague strikes terror to the heart of the average American. In 1909, there were more cases of typhoid in the United States than there were cases of plague in India, in spite of the fact that the population of India is two and a half times greater than that of the United States. We are also accustomed to think of Russia as a country subject to epidemics of disease and, as a matter of fact, in January, 1907, to October, 1911, there occurred in Russia 283,684 cases of Asiatic cholera; taking the same period of time, in making a conservative estimate, there were in the United States 1,250,000 cases of typhoid fever—more than 4 cases of typhoid for

¹ Public Health Reports, March 22, 1912.

every case of cholera in Russia. In 1910 and 1911, American travelers were deterred from going to Italy on account of cholera. There occurred there some 16,000 cases, with about 6000 deaths. In the United States in the same period of time, there were more than 500,000 cases of typhoid fever, and 50,000 deaths.

The individual can do little, apart from vaccination to prevent himself from the ravages of the disease. Vaccination will probably never be in general use, so that it remains for the health authorities to prevent the disease.

The problem of the transmission of typhoid fever is a many-sided one, including the transmission by water and by milk, the control of patients and carriers, the prevention of contact cases, and the spread of the disease by flies, and the study of rural typhoid as a source of epidemics. The one measure that stands out from all others is the prevention of the disease through the water supply. In Pittsburgh, since the installation of water filters, there has been an annual reduction of 400 in the death rate from typhoid alone. From the experience which we have had in past years, it would seem that the water supplies must be protected from one year's end to the other, and that at any time the water may become polluted and an epidemic started. The proper filtration of all water supplies coming from the surface should be undertaken, and a careful control of the filtration, by daily bacteriologic examination, should be insisted upon.

THE PRACTICAL CONTROL OF TYPHOID FEVER. The subject of the control of typhoid fever has, as everyone knows, been shockingly neglected in America. The subject has been dealt with perhaps most wisely in England and Germany, particularly in certain sections of Germany where an organized effort is being carried out to control every case of typhoid. It is not at all certain that we are familiar with every factor in the typhoid fight, but, be this as it may, there can be no question that the patient with typhoid, and the typhoid carrier, are primarily the two great sources of the disease. Of course, most of the epidemics come through polluted water and through milk, while a certain large percentage of cases are from direct contact. In order to eliminate typhoid the diagnosis must be made correctly and immediately. The health authorities should be notified, and there should be some definite and uniform method of control.

Price, Stokes, and Rohrer¹ have outlined the method which has been put in force along the water-shed of Baltimore City, and which should be enforced throughout the entire State. The inspector carries to the house in which the typhoid case is found a standard package which he unpacks, makes up the disinfectant solutions and explains their use. Enough disinfectant is provided to last four weeks. The inspector is also supposed to see the physician, and the attendant or nurse

¹ Journal of the American Medical Association, January 20, 1912, p. 163.

receives a copy of the printed instruction as given below: He is also supposed to visit the household during the patient's illness to see if the regulations are being complied with, and after recovery he removes the vessels and utensils which, after disinfection, are ready for reissue in another case.

DIRECTIONS FOR THE USE OF THE STANDARD PROPHYLACTIC PACKAGE FOR TYPHOID FEVER.

DIRECTIONS FOR USING OUTFIT.

Instructions to Inspectors.

The inspector, as soon as he reaches the household in which there is a case of typhoid fever, should unpack the package and prepare the necessary disinfectant solutions and demonstrate their use to the physician, nurse, or attendant on the sick person.

1. In one of the large buckets make up five gallons of disinfectant, as follows: With the agate-ware measure, measure out 19 quarts of hydrant or well water and 1 quart of 90 per cent. carbolic acid (phenol). This will make sufficient disinfectant to last for ten days.

The other large bucket should remain empty. Instruction should be given the nurse or attendant every time the urinal is used to empty in into the large empty bucket and to wash out the urinal with a quantity of disinfectant out of the other bucket equal to the amount of urine passed. The agate-ware measure should be used to measure out the disinfectant.

The inspector should also instruct the nurse or attendant whenever the bed-pan is used to wash it out with an amount of disinfectant from the solution in the bucket at least equal to the quantity of feces and urine passed into the bed-pan.

The nurse or attendant should be enjoined to receive all discharges in the bed-pan or urinal and to empty them into the second iron bucket and not to dispose of them in any other way.

Before leaving the house the inspector should secure a broomstick or iron poker and instruct the nurse or attendant to thoroughly mix the contents of the bucket every time a fresh quantity of stools or urine is poured into it. The broomstick or poker should be kept permanently in the bucket in which the discharges are disinfected, but may be lifted out temporarily when a fresh quantity of material is added in order to avoid contaminating the parts which come in contact with the hand.

After the case has recovered the broomstick should be destroyed by burning, or if a poker is used it should be heated red-hot in the fire throughout its whole length.

The bucket should be emptied at least once daily, and a period of

two hours should elapse from the time the last discharges have been poured into it before the bucket is emptied.

The inspector should warn the family of the poisonous character of the disinfectants and should also impress on them the danger of spreading the disease to others, if the discharges are not properly disinfected. He should also ask the family to call the attention of the nurse and physician to their special instructions which follow.

2. The inspector should place the enamel-ware basin on a table somewhere near the patient, or at any rate in the same room. He should then drop in three tablets of bichloride of mercury into the basin and add three pints of water with the agate-ware measure.

Nurses, attendants, or other persons caring for the sick person should be carefully warned to immerse the hands in this solution for one minute, vigorously washing during this time, after bathing the patient, changing the bed-linen, handling bed-pans or urinals, handling ice-caps, or in any other way coming in contact with the patient or the discharges from the patient. This solution should be made up fresh every other day.

3. Before leaving the premises the inspector should endeavor to secure a wooden or fiber wash-tub and place it outside the door of the sick-room. Into this tub throw 32 of the bichloride tablets, and with the agate-ware measure add 80 quarts of water. The nurses and attendants should be carefully instructed that whenever the bed-linen or clothing of the patient is changed it should be thrown into the tub and soaked over night before being laundered.

4. Separate table-ware, eating and drinking utensils, should be provided for the patient, and may be disinfected by boiling in a large dish-pan. Table napkins, towels and handkerchiefs may be placed in the solution in the wash-tub with the bed-linen.

5. Before leaving, the inspector should place the large mosquito netting over the patient's bed and call the attention of the nurse, and attendant, and family to its importance in preventing the transfer of infectious materials to food through flies, and also how much it will add to the comfort of the patient by keeping away flies and mosquitoes.

6. Inspectors should carefully point out to physicians and nurses the instruction under the subheadings, "Instructions to Physicians," and "Instructions to Nurses," respectively. A copy of General Order No. 39 should be placed in the hands of the nurse or attendant, another copy should be given to the householder, and a third copy to the physician is possible. The two bile culture outfits should be left with the nurse or householder for the physician.

Instructions to Physicians.

1. Physicians are requested to read over carefully the instructions to inspectors and to see that the measures instituted by the inspectors are continued during the illness of the patient.

2. Attention of physicians is called to the provisions of General Order No. 39, especially to paragraph 2 *et seq.*

3. The attention of physicians is especially called to the importance of determining when the feces and urine of the convalescent are free from typhoid bacilli. This matter is extremely important, since one convalescent or one chronic carrier case is capable of producing a widespread epidemic of typhoid fever. Special mailing outfits, containing sterile bile and full directions for making cultures from the discharges will be found in the outfit.

Instructions to Nurses.

1. Nurses, or attendants, and householders are requested to read over carefully the instruction to inspectors, and to see that the measures instituted by the inspectors are continued during the illness of the patient.

2. Attention is called to provisions of General Order No. 39, especially paragraphs 1 *et seq.* Attention of nurses is especially called to the great importance of thoroughly disinfecting all discharges in order to prevent the spread of typhoid fever through water-supplies, milk, and by flies, or by other means.

GENERAL ORDER NO. 39.

Regulations to Prevent the Spread of Typhoid Fever Through the Discharge of Infected Persons.

In accordance with the provisions of Section 70 of Article 43 of the Code of Public General Laws, the following regulations are hereby promulgated:

1. It shall be the duty of any householder when he shall have reason to know or suspect that a person within his family or house is sick of typhoid fever, to cause the stools and urine of such persons to be properly disinfected according to a method approved by the State Board of Health, during the full period of sickness and convalescence of such person.

2. It shall be the duty of any physician, nurse or attendant, attending upon or caring for any person known or suspected to be sick of typhoid fever or convalescent from said disease, to cause the stools and urine to be properly disinfected according to a method approved by the State Board of Health, during the full period of sickness and convalescence of such person.

3. Any person violating the provisions of these regulations will be subject to the penalties provided by Section 70 of the said Article 43.

4. These regulations having been passed by the State Board of Health at a regular meeting, June 1, 1911, and having been duly promulgated, have the force of law.

When the patient is well, the stools are examined to see if they are free from typhoid bacilli, using the lactose bile culture medium. The article does not state what method of procedure is followed in case typhoid carriers are found, which is a very important question from a practical standpoint.

A more thorough, and probably more practical, method of the disinfection of discharges from infectious diseases is the construction of some simple furnace in which everything can be burned. With a furnace, which can easily be made at a trifling cost to use either gas, coal, or wood, there can be no question of the thorough destruction of all infectious material. With disinfectant solutions there is always a doubt as to their efficiency, and, as ordinarily used by the average attendant, one feels certain that the discharges are not thoroughly disinfected and are a source of danger.

Typhus Fever. The subject of typhus fever has had a new and very practical interest added to it by the discovery that the disease, which had been described by Brill, in New York, and which has been called by his name, is really endemic typhus fever. Quite apart from this discovery, a number of very interesting studies have been made upon the disease and more definite knowledge has been gained about it than in the past seventy-five years. In fact, since Gerhard separated the disease clinically from typhoid fever, but comparatively little has been added to our knowledge of it, and owing to the comparative absence of the epidemics, particularly in America and Northern Europe, the study of the disease has not been possible owing to the paucity of clinical material.

In 1909, Nicolle, Conte, and Conseil reported the successful transmission of European typhus fever from one monkey to two others by means of the body louse. Shortly after, they pointed out that inoculations of the rhesus and capuchin monkey produced immunity. Independent of this work, Anderson and Goldberger made similar studies with Mexican typhus, (tarbadillo), and in one instance were apparently successful. Ricketts and Wilder, Gaviño and Girard, and a number of other observers, have also published studies on the virus of typhus fever. Ricketts and Wilder were able to transmit Mexican typhus by means of the bite of the body louse, both from man to monkey and from monkey to monkey, and they were also successful in transmitting the disease by introducing the abdominal contents of some infected lice into scarifications of the skin. In most instances, the monkeys were rendered immune, but did not show any marked febrile disturbance. Goldberger and Anderson¹ carried on a series of experiments with typhus fever, using the New York virus in cases of the so-called Brill's disease. They have been able to transmit the disease by means of the bite of the body louse. They were unable, however, to

¹ Public Health Reports, March 1, 1912, p. 297.

transmit it from monkey to monkey by means of subcutaneous injections of the crushed lice which had been chloroformed, and, in one or two attempts to transmit the disease from man to monkey by means of subcutaneous injections from a saline suspension of crushed body lice, the monkey so inoculated had resisted two subsequent inoculations, with virulent typhus blood. Up to this time, the body louse is the only insect suspected of transmitting the disease. Anderson and Goldberger have, however, demonstrated that the head louse (*Pediculus capitis*) may also transmit the disease, and have succeeded in experiments from monkey to monkey with Mexican typhus. Up to date, their experiments with this latter insect consist of subcutaneous injections of the crushed insect, but they believe that it may also be transmitted by its bite.

EXPERIMENTAL TYPHUS FEVER. Nicolle and Conseil¹ have published the third memoir on experimental typhus fever. This third article brings forth certain facts concerning the disease, the experiments having been made largely upon guinea-pigs.

The guinea-pig is susceptible to infection, 2 to 4 c.c. of blood from either man or monkeys having the disease being sufficient to produce it when injected into the peritoneum of the experimental animal. If larger doses are used, similar symptoms will be observed, but these increased doses are liable to prove fatal. The incubation period varies from seven to sixteen days. This is followed by an elevation of temperature lasting from four to eleven days, with an average of about one week. Toward the end of the febrile period, a small loss of weight is noted. Unless the temperature be taken, the infection might pass unobserved. In the animals which died from the disease, and those which were sacrificed during the course of it, no special lesions could be observed. It is possible to transmit the disease from one guinea-pig to another and the virus may be preserved indefinitely in laboratories by alternating the passage through guinea-pigs and monkeys. The blood of the infected guinea-pig is virulent from the beginning to the end of the febrile period. The isolated white blood corpuscles have the same virulence as the blood itself, while the red blood corpuscles, separated by similar methods under the same conditions, seem to be deprived of all pathogenic and immunizing power. The blood plasma, which is impossible to free entirely from portions of the white blood cells, preserves its virulence. Blood serum resulting from coagulation, and then centrifugalized for a long period, is not virulent even when given by intravenous inoculation. The same is true of cerebrospinal fluid if deprived of all its cellular elements. From these facts, the authors believe that they have advanced further proof of their former view that the infective agent of typhus fever is some organism in the leukocytes.

¹ *Annales de l'Institut Pasteur*, April, 1912, p. 251, and May, 1912, p. 332.

Animals which have been infected by inoculation of active virus by the bites of lice, or other means, develop a rapid and durable immunity, and this so far seems to be the only method by which immunity has been introduced. Sheep, goats, monkeys, dogs, rabbits, and chickens are entirely refractory to experimental inoculation with the virus. The serum from convalescents, taken a few days after the fever has become normal, has no effect whatever in the treatment of the disease as it occurs in man. They also determined that salvarsan is not only inactive but a dangerous remedy.

The various investigators named tried to discover the seat of the virus in the body, and, inasmuch as the disease may be transmitted by using blood, this part of the body has been particularly studied. Nicolle, Conte, and Conseil, as stated above, believe the parasite to be an intracellular one, while Anderson and Goldberger are of the opinion that the evidence so far adduced points to its being an extracellular parasite. There are considerable differences of opinion concerning the filterability of the virus. The first experiments by Ricketts and Wilder, and by Anderson and Goldberger seem to show that the virus does not pass through a fine filter. There have been several experiments which apparently prove that the filtered serum is capable of conferring immunity, but Anderson and Goldberger believe that these animals were not rendered sufficiently immune to prove the point, and they are of the opinion that merely a transient insusceptibility was present. They have repeated the experiment, and found, in one monkey inoculated with filtered serum, that it resisted successfully two immunity tests, but responded promptly to the third. It is not certain whether in the body of the louse, the virus is capable of passing a filter or not. Anderson and Goldberger have made one experiment only, which would seem to point to the filterability of the virus at this time, but this work will, of course, have to be repeated. The virus is not very resistant, and drying for twenty-four hours, and heating at 55° C. is sufficient to render it harmless, but it may resist freezing for a number of days. Gaviño and Girard found that it was destroyed after an hour contact with phenol in 0.5 per cent. solution.

TYPHUS FEVER AND BRILL'S DISEASE. In previous years I have noted the reports of Brill concerning a disease which he has described at Mt. Sinai Hospital, New York City, and since 1896 he has observed over 221 cases. Last year I called attention to the fact that Nathan had suggested that this disease was typhus fever, and Anderson¹ has made some experiments which point strongly to the identity of the two diseases. He found that the Rhesus monkey is susceptible to infection by inoculation with the blood from a case of Brill's disease, and that one attack confers indefinite immunity. These monkeys are also immune to the Mexican typhus. Monkeys that have recovered after

¹ Public Health Reports, February 2, 1912, p. 149.

infection with Mexican typhus have also been found to be immune to Brill's disease. Anderson is inclined to believe that the Mexican typhus, or tarbadillo, and European typhus are also identical. The result of this work will be the recognition of these sporadic cases of typhus, and proper means should be taken to restrict them. The disease is probably transmitted in the same way as the European typhus, that is, by the bite of the body louse.

The diagnosis of the disease may present certain difficulties, particularly if one has not a rather clear idea of the difference between it and typhoid fever. The following table of Nathan shows very well the different features of the two diseases:

TYPHOID	BRILL'S DISEASE—TYPHUS FEVER
Usually long incubation.	Short incubation, four to five days.
Onset not commonly abrupt.	Commonly with chill or chilly sensation.
Fever; gradually increasing ascent of temperature to fastigium—in all, about ten days.	Fastigium reached in three days.
Remissions of temperature occasionally more than a degree.	Rarely more than one degree.
Fall usually by gradations to normal, taking commonly one week.	Fall commonly by crisis, not longer than sixty hours.
Eruption, circumscribed, lenticular, papular.	Maculopapular, periphery indistinct and irregular.
Distribution, chiefly back and abdomen, seldom appearing on upper and lower extremities; almost unknown on palms and soles.	Distribution in addition to trunk on upper and lower extremities not infrequent, on palms and soles occasionally.
Eruption appears in crops throughout the disease.	Does not appear in crops.
Spots rarely confluent, and then confluence of but two spots.	Confluence may occur with three or four spots forming a number of patches.
Roseola disappearing on pressure.	Erythema, not disappearing on pressure.
Petechial spots (hemorrhagic) very rare.	Petechiæ occasionally.
Apathy and prostration late in development.	Apathy and prostration early.
Labial herpes rare.	Labial herpes in 6 per cent. of the group.
Diarrhea fairly common.	Constipation an almost invariable accompaniment.
Hemorrhages from the bowel often observed.	No intestinal hemorrhages or blood in feces.
Headache disappears in second week.	Is more intense and lasts throughout the disease.
Relapses observed by all observers.	Relapses have never occurred.
Widal reaction positive in over 95 per cent. of the cases.	Widal reaction invariably absent.
Blood cultures positive in over 90 per cent. of the cases.	Blood cultures invariably negative.
Convalescence slow.	Convalescence speedy.

THE IMPORTANCE OF TYPHUS FEVER IN CHILDREN. Nicolle and Conseil¹ have made a study of this subject, and have found that nursing infants apparently have a complete immunity. In one instance, a child, aged eight months, nursing the breast, whose mother, father, and three brothers were ill with typhus fever, was not affected at all. Older children may have the disease, usually in a very benign form, indeed so mild that it may escape attention. Five cases of undoubted typhus have been collected, and, in one of these, the blood inoculated into a monkey produced the disease in the animal. They are of the opinion that children may harbor the virus, and prove a source of infection which many times is not suspected.

Smallpox. THE TREATMENT OF THE VACCINATION SITE WITH PICRIC ACID SOLUTIONS. There is no question about the value of vaccination as a protective measure against smallpox, and there is probably no doubt that vaccination will continue to be used until some better method of producing immunity is discovered. Anything, therefore, that will lessen vaccination infections is to be welcomed. Schamberg and Kolmer² have suggested a novel method of preventing subsequent infection and vaccine wounds, and this consists of a 4 per cent. alcoholic solution of picric acid painted over the vaccinated area forty-eight hours after the insertion of the lymph. This in no way affects the success of the vaccination; it lessens the degree of subsequent local inflammatory reaction, and the authors believe that the patients are not so apt to exhibit constitutional disturbance. The epithelial covering of the vaccine lesion is hardened, and so there is much less danger of extraneous bacteria entering the vesicle; this is also probably aided by the antiseptic action of the picric acid. As a local antiseptic, it is about four times as efficient as phenol, and the ordinary skin bacteria are very greatly lessened by the application of solutions of picric acid.

SUCCESSIVE COWPOX VACCINATION. Rosenfeld³ has made a study of successive cowpox vaccination, using the small von Pirquet scarifier in order to get uniform results.

Following the reaction due to the injury to the skin, there is a latent period; the first specific reaction, according to Rosenfeld, occurs about one hundred and twenty hours after the inoculation. He found that if all the vaccinations were done at the same time, they ran a similar course. If they were done on successive days, papilla formation went along independently, and this may be regarded as a local phenomena. The red area about the papilla, however, may be regarded as the effect of the general reaction on the part of the organism, and this is the same in all the vaccinations regardless of the time at which they were done;

¹ Gazette des Hôpitaux, April 9, 1911, No. 42, p. 609.

² Lancet, November 18, 1911, p. 1397.

³ Journal of the American Medical Association, July 6, 1912, p. 16.

the involution began simultaneously in all points in whatever stage of local development they may happen to be.

The involution may be regarded as due to a general reaction on the part of the body. Rosenfeld did not mention the work of Bryce, of Edinburgh, published in 1802. He noted the fact that if a second vaccination is done not later than five days after the first, the second vaccination takes as if it had been a primary one and it will overtake the first in its course, mature and fade at the same time.

Verruca Peruana. This disease, which is sometimes called Carrion's disease, in honor of Daniel Carrion, who died as a result of his efforts to solve the problem of the nature of this affection, is endemic in certain districts of Peru. It was known among the ancient Peruvians, and was noted by the followers of Pizarro at the time of the conquest of Peru. It was described in 1730, and many times since, and attracted particular attention in 1870 at the time of the construction of the Oroya railroad over the Andes Mountains. In 1825, Carrion, who was at that time a medical student, inoculated himself on each arm on August 27; the initial symptoms appeared on September 17 and his death occurred on October 5 or thirty-nine days after inoculation. This showed very clearly the infectious nature of the disease. The disease is limited to three departments in Peru, and the infected areas are confined to certain deep river valleys of high altitude. The disease may affect persons of any age or sex, but those weakened by disease are more likely to be affected than others. The infection may also occur during intra-uterine life, children being born with the disease. Lower animals are also infected at times and show much the same character of the disease as human beings, but the skin lesions attain greater size. The natives of the infected districts appear to be immune. The disease appears in two forms—one malignant and one benign.

Two interesting articles have been published concerning this interesting and little-known disease, one by Darling¹ and one by Giltner². The malignant form of the disease, sometimes known as Oroya fever, begins like any acute infection, and then a febrile stage follows, characterized by an irregular remittent or intermittent fever. Accompanying this is a remarkably rapid and progressive anemia, the red blood cells falling quickly to below 1,000,000, sometimes even to 500,000 per cm. The red blood cells are of high index, and there are large numbers of nucleated red blood cells and a leukocytosis. There is also vertigo, restlessness, and air hunger. The mind remains clear. A large number of patients die, but those who recover may show a stage in which there is an eruption. The milder forms of the disease are said to be quite common; there is some fever and some anemia; there is also an eruption of a nodular type, which appears first in the form of purplish-red

¹ Journal of the American Medical Association, December 23, 1911, p. 2071.

² Ibid., p. 2074.

spots, but changes into papilla and later develops into warty tumors which may reach a very large size, and which have a tendency to spontaneous hemorrhage. The lesions also occur on the mucous and serous membranes, and in the subcutaneous tissues; these last for from four to six months and then gradually disappear, the tumor-like masses growing gradually smaller or less ulcerating. The mortality among the natives is said to be about 10 per cent., and among whites about 40 per cent. In the malignant forms, the mortality runs between 85 and 90 per cent. Barton and Biffi have isolated varieties of paracolon bacilli, and it should be borne in mind that in yellow fever the paracolon was described, some observers thinking that this was the cause of the disease. These infections should be regarded in the light of complications. In 1905, Barton called attention to certain bacillus-like elements in the red blood corpuscles, and, in 1909, he again described these bodies, which he believes to be protozoa and the cause of the disease. His investigations are confirmed by Gastiaburu and Rebagliatu in 1909. These bodies appear in the blood in the severer forms, and disappear about the time of the eruption. They are seen first as slender rods with rounded free ends, but are not visible in fresh preparations; they are best stained with the Giemsa stain. They may be single, but are usually from 2 to 6 or 8. Filaments of irregularly branched forms are also seen. Darling believes that these rods are a unique type of microorganisms, different from anything heretofore described, either in man or animals. He reports one case which occurred in a young American who contracted the disease while working on the Oroya railway. The patient was convalescing and started to return to the United States, but he died in Panama Bay; an autopsy was subsequently performed. The disease is supposed to be transmitted by the bite of an insect, possibly a tick or other suctorial invertebrate. The diagnosis of the disease is not always easy, although in the infected district the patient's fever, anemia, vertigo, rheumatoid pains, and enlargement of the lymph nodes should be regarded as suspects. As soon as the eruption appears, the diagnosis becomes easy. In former times the disease was confused with yaws. No special suggestions have been made regarding the treatment, which up to date has been carried along on symptomatic lines. As a prophylactic measure, the following is a suggestion of Dr. Barton: Workmen employed in the infected zones should have their sleeping places out of the endemic district—this has been carried out in the Oroya railway with considerable success.

The Treatment of Vincent's Angina. It is not very often that Vincent's angina gives rise to any very serious difficulty, and yet sometimes the infection seems to be of a particular virulent character and to resist ordinary antiseptics.

Achard¹ has made a suggestion which he has tried clinically, and which

¹ *La Semaine Médicale*, October 9, 1912, p. 488.

opens up a new field of experimentation with salvarsan. He suggests the use of the remedy locally, and, from the few experiences of the author quoted and other observers, it would seem that this method of treatment is without danger, which is more than can be said of some of the other local applications which have been tried in some of the severe cases of this disease. The method is certainly worth trying should one have occasion to resort to anything more than the simpler applications.

Whooping Cough. OPTIC NEURITIS IN THE COURSE OF WHOOPING COUGH. Wiegmann¹ has reported an interesting example of a rare condition consisting of a double optic neuritis, occurring as a simple papillitis without marked edema, coming on in the course of whooping cough in a woman of forty. The optic disk in both eyes was congested, the limits somewhat uncertain, and the veins tortuous. In the left eye there were two small hemorrhages. The acuteness of vision was somewhat diminished, and the visual field somewhat contracted for colors. The symptoms and signs gradually disappeared, and six months later there was only slight pallor of the papilla with excellent vision. About two years ago, Nacht² reported a case of a child in which there was complete amaurosis with double choked disk which necessitated a decompressive operation.

ANTIPERTUSSIS SERUM. Various efforts have been made to secure an antitoxin for whooping cough, but without a great deal of success. One of the latest reports is by Klimenko.³ This serum is prepared by injecting a suspension of the bacillus isolated by Bordet and Gengou, cultivated for forty-eight hours on gelatin. Injections are made directly into the veins of horses, first with cultures that have been heated to 56° C., and, later, with living cultures, gradually increasing the dose each week. Klimenko has treated thirty-five patients. In all cases, the blood serum of the patient agglutinated the organism, and the diagnosis was also made on the clinical signs. The serum was injected under the skin of the thighs or abdomen, and the doses varied from 25 to 50 c.c.; the number of injections given also varied. He states that, in all cases, the number of attacks of coughing was diminished, and there was marked improvement in the general condition. Twenty-one of the patients remained in the hospital until they were cured. Of these, the spasmodic stage ended, in 12, after five weeks. In 6, there were complications of various kinds which prolonged the course of the disease. Compared with other children treated in a neighboring service, the course of the disease was shorter and less severe. The extreme variability of whooping cough, and our experience with previous whooping cough cures of various kinds, leads us to believe that this serum

¹ Klinische Monatsblätter f. Augenheilkunde, April, 1912.

² La Semaine Médicale, 1910, p. 401.

³ Ibid., October 23, 1912.

of Klimenko is in its present state not sufficiently potent, if it has any action at all, to warrant its being recommended. It may be that the serum does not contain a sufficient number of antitoxic units or that the dosage has not been properly regulated, but until all these points are settled, one would be inclined to regard this method of treatment with considerable suspicion, although there can be no question of the value of studies such as he has made.

THE BACILLUS OF WHOOPING COUGH AND PERTUSSIS VACCINES. For a great many years after infectious diseases had been studied from the standpoint of bacteria, the organism which caused whooping cough was a subject of a great deal of discussion, and a large number of different organisms were described.

In 1905, Bordet and Gengou described a small bacillus which could be obtained from the sputum of the trachea and larger bronchi. From the great many observations that have been made by various individuals there seems to be no doubt that this organism is the real cause of whooping cough. Klimenko and Fraenkel were able to produce typical attacks in monkeys by injections of this organism, and more recently Ignabo¹ injected this bacillus into an ape who, after an incubation period of eighteen days, had a catarrhal stage of two days, a paroxysmal stage of twenty-four days, and a stage of decline for nineteen days. Vaccines prepared with this organism have been used by various observers, among whom may be mentioned Graham² and Ladd.³ Bordet tried a vaccine, and, in his cases, the patients all had unusually severe attacks and he believed that he had produced a marked negative phase. The other authors mentioned had no bad effects, but they used small doses, which may perhaps account both for the absence of reaction and the absence of any very noteworthy good results, although it must be said that some of the cases seemed to run a shorter course than might have been expected in the ordinary course of events. The use of such a vaccine in whooping cough is a subject that certainly deserves very careful consideration, and those physicians having a large amount of clinical material would do well to try this method of treatment, with the view of definitely determining whether or not it has any real value. The question of the size of the dose and the interval of injection is so important in vaccines that the results, which have not been particularly brilliant so far, may be found, with further study as to dosage, to be of the greatest possible value.

THE PREVENTION OF WHOOPING COUGH. Whooping cough is a disease of far greater seriousness than is ordinarily supposed, and yet comparatively little is done to prevent the disease. Rucker⁴ has called

¹ Zeitschrift f. Kinderheilkunde, June 15, 1912.

² American Journal of Diseases of Children, 1912, vol. i, p. 41.

³ Archives of Pediatrics, 1912, p. 581.

⁴ Public Health Reports, October 25, 1912.

attention to some of the points in connection with it, and to certain statistics which are very striking. Of all the deaths registered in the United States during the year 1910, 30.7 per cent. occurred in children fifteen years of age, 19.2 per cent. in children under one year of age, and 23.3 per cent. in children under two years of age. During the year 1910, the death rate per 100,000 from measles was 12.3 per cent., from whooping cough 11.4 per cent. Scarlet fever, justly regarded as a very serious disease, had a death rate of 11.6 per cent. per 100,000, and diphtheria 21.4 per cent. Something like 10,000 children are sacrificed to whooping cough every year, and a great many more suffer from more or less permanent complications. Rucker calls attention to a suggestion made by the Virginia Health Bulletin, that of wearing a broad band of ribbon on the arm for purposes of marking whooping cough cases, so that other children and the nurses of children could take warning and so avoid infection. Whooping cough is particularly liable to spread on account of the extreme infectiousness of the disease during the early stages, and also on account of the shocking disregards for the rights of others by those who have to care for whooping cough patients, and who, in their endeavor to get children out of doors, often take them upon street cars or in play grounds, and allow them to spray the highly infectious sputum over many other people and particularly other children. Another suggestion is the use of paper napkins in place of handkerchiefs. These can be burned after use. Directions suggested for sterilizing various articles which have been in contact with the patient would scarcely be carried out in the average household, and, while the disease may undoubtedly be carried in fomites, the danger of the transmission of disease in this way certainly is exceedingly slight, most of the cases coming either from direct contact with the patient, or by breathing the germ-laden air in their immediate neighborhood after the patient has coughed. In this connection, however, one remembers the classic example occurring at the Island of St. Helena which for many years had been free from whooping cough. The case occurred in 2 children of a washer-woman who washed the clothes from some children who had the disease on board the ship which touched at the island, and in which there was no other possible source of transferring the disease to the island.

IODINE IN THE TREATMENT OF WHOOPING COUGH. The use of iodine in various infectious diseases has been increasing rapidly of recent years, and it has been used both locally and internally. It is believed that iodine introduced into the body will cause a more or less leukocytosis, and it apparently increases, also, the defensive functions of the tissues. Its use has been suggested in typhoid fever, typhus, cholera, and cerebrospinal fever, and now Cavazzani has suggested its use in whooping cough, and he believes that it is one of the most efficacious remedies that we have at our disposal. The effect of the

drug is to lessen both the cough and the other disagreeable symptoms, and, in the cases in which it has been started early, Cavazzani believes that the course of the disease has been more benign than it would have been without the treatment. In a disease as variable as whooping cough, it is exceedingly difficult to say, without a very large series of cases, what the effect of any method of treatment really is. Cavazzani has suggested the use of a solution containing 1 gram of iodine and 15 grams of iodide of potassium in 15 grams of distilled water. This solution is more stable than the tincture of iodine and has but little tendency to evaporate, and its taste is easily masked; it is best given by dropping it in sweetened milk or in coffee. From 4 to 6 drops may be given a day in divided doses to children aged one year, and from 6 to 10 drops in those from two to five, and from 10 to 15 drops in older children.

Salvarsan in Yaws. According to a report¹ from Trinidad, 500 cases of yaws (*Framboesia tropica*) were treated with salvarsan, doses of 9 grains being used for adults. Of the 500 cases, 498 were cured. Four hundred and nine of these, or 82 per cent., were cured with one treatment, 75 required a second injection, and 14 had to be treated a third time. There were two resistant cases, and there were five relapses. There were no complications of any kind, and up to the present time salvarsan may be regarded as the most valuable means of treating yaws. In this connection it is interesting to note that Sabella² has contributed an article dealing more particularly with his experiences in Tripoli with neosalvarsan. The results obtained are similar to those observed by others. He has called attention, however, to the extreme danger of a new population contracting the disease on going into Tripoli, and suggests, as a prophylactic measure, the isolation of all persons suffering with yaws and their treatment by means of injections of neosalvarsan.

¹ Public Health Reports, March 22, 1912, p. 432.

² Il Policlinico, Sezione Pratica, August 25, 1912, p. 1261.

DISEASES OF CHILDREN

BY FLOYD M. CRANDALL, M.D.

Infant Mortality. During the past year the subject of infant mortality has received even more than the usual attention from pediatric writers. It has, in fact, received more consideration from them than any other single subject. The approaching Congress of Hygiene and Demography had some influence, perhaps, in stimulating study in this direction. As it becomes more apparent year by year that many infants may be saved, who have been lost in the past, efforts have been increased to ascertain the causes of death and devise methods by which they may be obviated. A recent monthly bulletin of the New York State Department of Health (May, 1912) presents a half-dozen excellent papers upon this subject. The fact, already well known, is shown by these papers that the great majority of the deaths of infants are preventable. The State Department of Health calls upon local boards of health, upon the members of the medical profession, upon social workers, upon the press, and upon the citizens generally to coöperate in a campaign for the checking of this awful and needless waste of human lives for which maternal love so recently endured the perils and pains of childbirth.

Some of the first steps a local board of health can take are thus specified: Enforce the law regarding the registration of births in order that we may have an accurate measure of the problem and of our success in meeting it. Make a special study of the causes of deaths among infants under one year of age, paying special attention as to whether the child was breast fed or artificially fed. The preparation of a community map in which the location of each death of an infant is represented by a dot will help in determining whether efforts should be concentrated and may indicate a need for improved sanitation. Educate mothers in the care of themselves and their babies by lectures, illustrated talks, and by the distribution of such circulars as "How to Save the Babies," and "The Care of Milk in the Home," issued by the State Department of Health. Wherever possible establish an infants' milk depot where poor mothers can get suitable food for their little ones, where children who are not thriving and those who are sick can be brought to the dispensary physician, and where a visiting nurse can instruct the mothers in the care of their children, supplementing this instruction by a visit to the house. Coöperate with other organizations that may be working along similar lines and correlate the work

of all so that there shall be no duplication, and that every ounce of effort will tell. Study the sources of milk supply of the community, and adopt reasonable regulations governing the sale of milk in the community. Enforce quarantine regulations in connection with communicable diseases and carry out efficient disinfection.

No better description of the duties and opportunities of boards of health in the direction of preventing infant deaths could be given than this. An excellent paper of the series above referred to is by Prof. Wilcox, of Cornell University, who presents an extended study of conditions affecting life in New York City. The same bulletin also contains an article by Shaw, of Albany, on the duties of the mother; by May, of the Department of Health, on communicable diseases as they affect infant vitality, and Prof. Ogden, of Cornell University, upon the relations of the sanitary condition of a city to infant vitality. Two articles in the same bulletin are of somewhat unusual character. The one is by Theodore Horton, Chief Engineer of the State Department of Health, upon rural hygiene as affecting infant welfare; the other by H. L. Wheeler, D.D.S., upon the relation of difficult dentition to infant mortality.

The subject is considered by E. M. Sill,¹ who states that at least 100,000 babies may be saved from untimely death each year and so lessen the present fearful mortality in this country. The annual deaths reported in the registration area of the United States in 1908 (which represented 45,028,767 or 51.8 per cent. of the total estimated population) were in round numbers 200,000. It is believed that over 400,000 infant deaths occur annually in the whole country. Taking the deaths of children under one year of age, in the various countries over the civilized world, we find that the annual number of deaths amounts to 3,243,985. It is believed by Prof. Irving Fisher, that of all the diseases of infancy having medial age of one year, 47 per cent. might be prevented with our present knowledge of sanitation.

In a study of the *relation of breast-feeding and infant mortality*, W. H. Davis² found that the increase of deaths among breast-fed babies during the summer months was very slight. Among infants over two weeks old born of native mothers, only 16 per cent. of the deaths occur among breast-fed children, while in babies over two weeks of Italian mothers 53 per cent. of the deaths occur among breast-fed children. Bottle-fed children between the ages of one and three months show the highest mortality, especially those babies having mothers born in the United States. The bottle-fed infant over two weeks old is six times as likely to die as the breast-fed infant. Breast-feeding of all babies would have saved in one year, in the city of Boston, nearly one thousand lives.

¹ Virginia Medical Semi-Monthly, June 21, 1912.

² Boston Medical and Surgical Journal, February 15, 1912.

Levy,¹ of Newark, in considering *the relation of social and economic conditions on infant morbidity and mortality* lays stress upon the importance of "good mothering." By this term he means a healthy inheritance and maternal nursing. All else is secondary and either does, or can be made to, accompany these two conditions. Without these, all suggested solution of the problem of infant mortality are but makeshifts. Some very striking figures are presented by W. H. Davis,² which show the influence of maternal nursing upon child life. He asserts that the bottle-fed baby over two weeks old is six times as likely to die as the breast-fed. There were in 1911, 621 deaths from diarrhea and enteritis, of which 87 were breast-fed, and 534 bottle-fed, that is 86 per cent. bottle-fed. If all the babies had been breast-fed, the estimated deaths would have been 493 less. Breast feeding of all babies in 1911, in Boston, would have saved over 1,000 lives, reducing the death rate per thousand births from 127 to 71, making the total deaths among children of native mothers 470 less, Irish 160, Canadian 97, Italian 87, Russian and Polish 85 less respectively.

Some striking statistics are presented by Williams,³ of Rochester. After studying *the relation of market milk to infant deaths*, he concludes that not one cause, but a group of causes must be held responsible for these deaths. The more important of these factors are: Diseased or physically unfit parents; dirty, disease-breeding homes; neglect and bad care; improper methods of feeding and using unsuitable foods; dirty and disease-carrying milk. *The importance of prenatal care of the infant* is urged by E. P. Davis.⁴ B. M. Anspach⁵ presents an excellent paper upon *what the obstetrician can do to reduce infant mortality*.

Although of the highest importance, it is impossible to consider the details of this subject within the limited space of these pages. I attempt to call attention each year to its importance, presenting sufficient facts to suggest to the practitioner the duty of studying the subject and doing, so far as he is able, his part to diminish the number of child deaths. Were any excuse necessary for presenting this subject year by year, it would be amply explained by the fact that the last presidential address before the American Medical Association was devoted to the best means of combatting infant mortality. That Jacobi⁶ should consider the subject worthy of such prominence is ample reason for the belief that it is one of paramount importance to the wellbeing of the nation.

Child Welfare. As a result of the study of recent years of infant mortality and the efforts to reduce it, the child welfare movement

¹ Archives of Pediatrics, January, 1912.

² Boston Medical and Surgical Journal, February 15, 1912.

³ New York Medical Journal, July 13, 1912.

⁴ Therapeutic Gazette, September, 1912.

⁵ Ibid.

⁶ Medical Record, June 8, 1912.

has attained decided proportions in this country and abroad. An act creating a Child Welfare Bureau¹ was recently placed with the approval of President Taft upon our national statute books. This legislation had been earnestly and continuously advocated for several years by progressive men and women, and during its pendency in Congress no reasonable argument was ever advanced against it. Certain conservative statesmen were shocked that "children were to be treated like pigs;" but they were silenced by the retort of the more enlightened that, as a matter of fact, pigs were being better treated by the federal government than children, since the government has for years gathered and disseminated information concerning the welfare of pigs, but the questions relating to the life, health, and welfare of children it has left almost alone.

The new bureau will be part of the Department of Commerce and Labor. Its duties and functions will be wholly educational. It will make investigations, collect information, classify, digest, and publish it, and furnish it on application to State, municipal, and other authorities, as well as to private bodies or persons. It will study laws and ordinances bearing on child labor, education, play, discipline, juvenile courts, and like institutions and all measures or proposed measures designed to protect, reclaim, or healthfully develop childhood. Such studies will in turn suggest and influence further legislation. It was in the highest degree important to give this new and largely experimental bureau a good start. President Taft has done this, rising fully to his opportunity and surprising many politicians by appointing as the director and chief of the institution Miss Julia C. Lathrop, of Chicago. She will be the first woman to direct a federal bureau. Her fitness for the position is quite exceptional.

The relation of the infant welfare movement to pediatrics is considered by Cooley,² of Detroit. He shows the scope and importance of this movement in relation to preventive medicine and considers its most important development the education of mothers, prospective mothers, and young girls in the care of themselves and children. There is grave danger of the work being taken over by the health departments before standards have been set. The means for bettering the condition of the growing child are considered by Sills,³ of New York, who lays chief stress upon the importance of proper home training of children.

The methods adopted in Paris in welfare work are described by Gidal.⁴ The measures regarded by that writer as most important are weekly consultation and instruction of the mothers and nurses; and semiweekly consultations for children not in good health. In cases of illness, they receive particular care, and nurses are given special

¹ Journal of American Medical Association, April 27, 1912.

² Medical Record, June 15, 1912.

³ *Ibid.*, May 11, 1912.

⁴ Bulletin de l'Académie de Méd., December 19, 1911.

instruction. The measures for child welfare in Russia are described by Hubert.¹ In Nice, the welfare organization movement has been particularly active and has been described by Balestre and d'Oelsnitz.² An interesting article on legislation in Ireland in its relation to infant life is that of Horn.³

The value of a social service department to the children's dispensary is the subject of an excellent paper by Ostheimer,⁴ of Philadelphia. He shows that, as the result of experience in Philadelphia, many conditions deemed incurable by parents had been either cured or greatly improved. He said that within twenty-four hours after a child had been to the dispensary the social service department nurse visited the home to investigate conditions—sanitation, hygiene, housing, food, illness, work, etc. She saw that all the physician's orders and advice were understood and carried out; left diet lists; corrected abuses or bad habits; and sent the child back to the dispensary. If there were other illnesses in the family she referred them to the hospital. If necessary, she helped some to sanatoria, or open-air schools, and secured open-air positions for those who needed them. She worked closely with the Children's Home and Aid Society, often securing wet-nursing mothers for babies with inanition. By this plan the mortality, especially during the summer, had been greatly reduced. In discussing this paper, Fussell⁵ asserted that marvellous results had followed this work in Philadelphia. The particular feature, he said, was the visiting nurse, who looked into all the conditions and followed up the cases, instructing in care and hygiene. No nurse was expected to recommend any measures of treatment or in any way to interfere with the work of the physician, but where she found patients with conditions that needed attention, she saw that they got to the physician, who, in turn, recommended them to the proper department for treatment. The nurse, in visiting the home, acted as much in conjunction with the physician as any well-trained nurse in private practice would do.

Height and Weight of Children. In describing some observations made upon the height and weight of feeble-minded children, Goddard,⁶ of Vineland, is strong in his belief that there is a close correlation between mental development and physical growth. The growth is not only usually stunted, but the entire organism is disarranged in the average low-grade idiot. He observed the same conditions to a less degree in the imbecile. He asserts that all defectives are heavier at birth than normal children.

Asphyxia Neonatorum. The remarkable experiments of Meltzer and Auer on intratracheal insufflation made at the Rockefeller Institute,

¹ Archives f. Kinderheilkunde, 1912 lvii, Nos. 4 to 6.

² Archives de Méd. des Enfants, February, 1912.

³ Dublin Journal of Medical Science, January, 1912.

⁴ Medical Record, June 15, 1912.

⁵ Ibid.

⁶ Journal of Nervous and Mental Diseases, April, 1912.

led Plauchu, obstetrician to the Hospitals of Lyons, France, to devise an apparatus of a size suitable to newborn infants. After considerable use of this method, he believes that it embodies a great advance for the reanimation of asphyxiated infants. The principle of the method of Meltzer and Auer is well known. A continuous current of air directed as far as the bifurcation of the trachea through a tube of small caliber, produces a ventilation of the lungs sufficient for oxygenation of the blood even if there are no respiratory movements. The air injected into the bronchi returns between the catheter and the tracheal wall, and can also remove foreign bodies and mucus that may be in the respiratory tubes. The apparatus is composed of a rubber bulb; a T-tube, one branch of which is united to the rubber bulb, and another to a small mercury manometer, while the third is connected to a rubber tube ending in a metal cone; a gum catheter No. 12.

A rod of soft copper is placed in the catheter in order to give it the proper shape for introduction into the glottis. The caliber of the catheter was selected by Plauchau after an anatomical study of the trachea on the cadaver. The internal diameter of the trachea of a newborn child is 4 mm. There is allowed, therefore, between the wall of the trachea and a catheter No. 12 (Charriere) a sufficient space for the returning air current. The end of the catheter must reach the bifurcation of the trachea. This point is located at a distance from the mouth which varies according to the size of the child. For a child weighing 2000 gm. the distance is 8 cm; 3000 gm., 10 cm; 4000 gm., 12 cm. Therefore three transverse lines are marked on the catheter to indicate how far it should be introduced according to the weight of the child.

After removing the mucus, the index finger of the left hand of the operator is introduced as far as the upper end of the esophagus so as to feel the hard rounded prominence which is formed by the posterior face of the larynx, the two arytenoid cartilages, and to find in front of them a soft opening, which is the glottis. The catheter, containing its copper wire to which a proper curve has been given, is introduced by the right hand between the tongue of the child and the palmar surface of the left index finger of the operator and thus penetrates easily into the trachea.

When the catheter has reached the proper distance, the copper rod is removed. The end of the insufflation apparatus is now attached to the catheter and air is injected through the catheter by the rubber bulb, while the mercury manometer is watched. The pressure must not exceed 10 or 15 mm. Soon the noise of the returning current of air passing through the lips of the child is heard. The manometer indicates that there is no overpressure by accumulation of air in the respiratory apparatus. Therefore, the conditions of ventilation are known, and no accident is to be feared. The insufflation is to be

continued as long as is necessary. After a few minutes the child appears to be less atonic, the heart becomes stronger and more regular, and the respiratory movements start. The catheter is removed when the infant is in a condition to carry on automatic respiratory movements. The method must be applied under well-defined conditions. If it is used in mild cases of asphyxiation, it is certain that it will give constant positive results as do all the other methods.

After writing the above, Dr. John Rogers, a Surgeon of Bellevue Hospital, described to me the recent saving of a patient by this method, who had apparently died on the table during the course of an operation on the neck.

Hemorrhage in the Newborn. One of the most striking advances in treatment of recent years is the *serum treatment of the hemorrhagic diseases of newborn infants*. Last year I¹ gave extended consideration to this subject, quoting the most recent reports made at that time by Welch, who gave his method to the profession. He² presents another extended paper this year, the results being equally satisfactory with those previously reported. Favorable results are also reported by Nicholson.³ The method seems by continued experience to fulfil earlier expectations. In spite of a vast literature, our knowledge of the causation of hemorrhage in the newborn is incomplete. The clinical picture varies widely in different cases. The lesions revealed by postmortem examination are inconstant. Bleeding from the skin, the umbilical cord, the mucous membranes, or the viscera is the only feature common to all cases. In addition to the general disease which may be the underlying factor in the production of hemorrhage, the ultimate cause of all persistent and uncontrollable bleeding is probably a blood or vascular change. It seems only rational to suppose that the initial bleeding is induced by a vascular lesion. The cause for persistent hemorrhage is to be sought in some defect of the normal mechanism for the control of bleeding—the clotting of the blood.

Schloss and Commiskey⁴ report observations made in numerous cases. Nine of their patients were treated by means of the subcutaneous injection of whole blood. This procedure they assert is simple, harmless, and so far as can be judged from a small series of cases, efficacious. They believe that the best results can be obtained from the injection of from 10 to 30 c.c. of blood, the injection to be repeated every four or eight hours as long so the hemorrhage continues.

It can scarcely be expected that such a therapeutic measure will prove a cure in all cases. There are apparently a number of conditions differing in nature, which may be responsible for hemorrhage in the newborn, and there is no indication that the pathological condition

¹ PROGRESSIVE MEDICINE, March, 1912, p. 248.

² Therapeutic Gazette, February 14, 1912.

³ Ibid.

⁴ American Journal of Diseases of Children, April, 1912.

of the blood is always the same. In cases in which the hemorrhage is profuse and which are, as a rule, quickly fatal, it seems scarcely possible that any of the simpler methods could be of value. In the treatment of such cases, the immediate transfusion of human blood is probably the only means from which any result could be expected.

The studies of Schloss and Commiskey seem to warrant the conclusion that, in the hemorrhagic conditions of the newborn, the coagulation of the blood may be normal, delayed, or absent; and that a deficiency or absence of thrombin or fibrinogen may give rise to imperfect blood coagulation and uncontrollable hemorrhage. In some cases of hemorrhage in the newborn, in which coagulation is apparently normal, it seems probable that the hemorrhage is due to some localized vascular lesion or defect, present only in the areas from which the bleeding occurs.

Icterus Neonatorum. Extended study of icterus in the newborn by means of the duodenal catheter is reported by Hess,¹ of New York. His tests show that bile is very rarely secreted during the first twelve hours of life; it was obtained but once in the course of 52 tests. Bile excretion during the subsequent twenty-four hours is variable; in cases of marked jaundice, it is profuse; in cases not jaundiced, it is scanty or absent. The function of excretion gradually becomes fully established during the first week or ten days of life. When jaundice manifests itself, it precedes the excretion of bile into the duodenum. Secretion of bile varies within wide limits. In general, it is marked when the jaundice is marked. The occurrence of jaundice results from a defective correlation of excretion and secretion. It is generally caused by the inability of the rudimentary excretion to cope with the sudden profuse secretion of bile. Icterus neonatorum has long been the favorite domain of hypothesis. Hess proposes no new theory. It would seem that, in most cases, there is a disturbance of secretion, a polycholia, or, according to Stadelman, a mere increase in the formation of the bile pigment (pleiochylia). In many of the cases of marked jaundice this hypersecretion reaches an intensity so marked that bile overflows into the stomach, where it may be found on introducing the stomach-tube, or manifests itself by its presence in the vomitus. The cause of this pleiochylia is not at present definitely proved, so that it would seem advisable to follow the principles of the physiology of bile secretion and assume, what seems probable, that it is due to an increased amount of available hemoglobin; that bile salts are absorbed from the intestine, resulting in a disintegration of blood cells and a consequent increased elaboration of bile in the liver. Whether or not this explanation will prove correct does not alter the fact of the usual occurrence of a hypersecretion.

In addition to the disturbance of secretion, there is a coincident

¹ American Journal of Diseases of Children, May, 1912.

disturbance of excretion, and it is probable that were excretion as well provided for at birth as in later infancy, there would be no disturbance, such as icterus neonatorum. We find, however, that the liver is most inadequately equipped to excrete this excess of bile; that during the first hours of life there is practically no functioning excretory mechanism, and that function manifests itself but gradually. The bile is secreted under low pressure, but where an excess is secreted, as is generally the case in jaundice, the pressure is proportionately increased, so that a profuse excretion of bile into the duodenum occurs. There has been too little consideration of the interrelation of secretion and excretion. The former may be said to be the more important, for in some cases in which there is but slight secretion, the rudimentary excretory function suffices to prevent the manifestation of icterus.

Ophthalmia Neonatorum. Many articles appear each year upon this subject. It is certainly one worthy of careful consideration by the practitioner. One of the best articles of the recent year is that of Mackenzie,¹ who reports observations made upon 388 newborn infants admitted to the Charitable Eye and Ear Infirmary. Of these, 23 were discharged totally blind and 42 partially so. It is a startling fact that 272 were attended at birth by physicians in private practice and only 10 by midwives. Other patients came from dispensaries and other hospitals. Mackenzie urges the importance of careful daily observation of the child as our preventive means are not infallible. An interesting study based upon 37 cases is reported by Alice W. Tallant.² The prophylactic treatment advised by her is that in general use, namely, one drop in each eye of a 1 per cent. silver nitrate solution.

An excellent article on the treatment of ophthalmia in the newborn written by Brav,³ warns against the use of a silver solution stronger than 2 per cent. He warns also against injury of the conjunctiva when greatly inflamed, by attempts to force the lids apart. When they are much swollen and the blepharospasm is marked, it is best to first apply cold compresses until the inflammation is reduced. Attempts to force the lids open may then be made with much less danger of injuring the inflamed surfaces. The cold compresses should be applied constantly day and night for three or four days in all the more marked cases. Very mild antiseptic solutions are of great importance, one of the best being a bichloride solution of 1 to 10,000. The conjunctival sac should be irrigated with this every half-hour, every bit of discharge being removed each time. This is best accomplished by the use of the eye dropper. Brav insists that cold applications and frequent washings are the two most important measures of treatment. He frequently uses a 25 per cent. solution of argyrol. The most effective germicide

¹ Boston Medical and Surgical Journal, May 16, 1912.

² Archives of Pediatrics, July, 1912.

³ Therapeutic Gazette, October, 1912.

of all he believes to be silver nitrate, which he regards as better than any of the more recent silver preparations. He applies a 1 per cent. solution himself every day, using an applicator and cotton. After about a week, he changes the treatment and employs a solution of zinc sulphate, one grain to the ounce, in place of the bichloride solution, and later he uses a saturated solution of boric acid. He believes that all cases of ophthalmia neonatorum should be treated at home, as they do better there than they do in the hospital.

Premature Infants. An interesting article on the fate of the prematurely born is that of Wallich and Fruhinsholz.¹ Their object was to obtain the later history of infants born prematurely and, upon the other hand, to trace back the history of older children. They assert that the first case recorded is that of a professor at Padua, who was born in the sixteenth century and lived to be eighty years old. Among premature children who have become famous are Newton, Rousseau, Voltaire, Cuvier, Victor Hugo, Lamartine, Renan, and Phillips Brooks. The authors believe that the final outcome depends largely upon the weight at birth. Among 17 children weighing from 900 to 1500 gm., 41.1 per cent. developed into normal adults. About an equal number were but slightly underdeveloped. Among 27 slightly handicapped children, injury from forceps or other obstetrical operation may have been a factor. In tracing back the history of 1804 patients in a surgical service and 620 patients in an asylum for the feeble minded, it was found that about 12 per cent. of the former, and 8 per cent. of the latter were premature infants. As these cases were selected from those seeking medical aid, it would certainly seem that premature birth was not a very active factor.

In an article on *the care of premature infants*, Durham,² of Brooklyn, asserts that a child weighing 4 pounds may be considered to be either premature or congenitally feeble. According to this author, in 2314 births in Sloane Maternity Hospital, there were 410 premature babies, of which 74 were stillborn. There were, therefore, 336 cases suitable for treatment; 85 were treated as infants at term, and 4 died; 143 were wrapped in cotton and not placed in the incubator and 12 died; 106 were treated in the incubator. Of the latter, 29 died in 4 days; 6 were under seven months' gestation, and 77 survived the first four days. Of the latter, one-third were known to be living after a period of from three months to three years. Five of these babies weighed less than 3 pounds.

Edema in Infants. In a paper on this subject, Potter,³ of East Orange, says that edema, either localized or general, is infrequently met with in children. While it is certainly not common, from my own experience I should say that it is not especially infrequent.

¹ Annales de Gynecologie et d'Obstétrique, November, 1911.

² Archives of Pediatrics, June, 1912.

³ Ibid., March, 1912.

Anemic children, if attacked by diarrhea or acute illness, not infrequently become edematous. Potter states that in the last four years he has seen 17 cases of dropsy in young infants not of cardiac or renal origin. Many practitioners might regard this as an unusual experience, but it does not seem to me unusual for one who is carefully observing a large number of children. It is a condition, not a disease *per se*, a condition with special significance, and with special indications for a certain and particular line of treatment. It occurs usually in children suffering from extreme malnutrition and diarrhea. A typical case showing this condition is that of a young baby showing extreme malnutrition that suddenly develops diarrhea. Because of the diarrhea the diet is changed to boiled water, barley water, or perhaps whey. After an interval of several days during which the baby progressively loses weight, while the bowel condition perhaps improves but not enough to warrant marked decrease in the solid constituents of the diet, on one certain day a gain of several ounces is noted at the daily weighing followed the next day by an additional gain. The dropsy in these cases is not due to disease of the kidney or the heart, nor to any other physical condition that can be detected.

It is not what the babies are being fed that causes the dropsy; but, what they are not being fed. Potter is convinced that it is owing to the fact that they are not getting enough proteids. It may be that in many of these cases the continuance of the diarrhea itself is due to the deprivation of solids in the food. In all cases of intestinal disturbance of such character as to necessitate the curtailment of food or the prohibition of some of the food elements, it is always a difficult question to decide when to increase the amount. It is unquestionably the fact that we often keep up the curtailment of some of the food elements for a longer period than is necessary. The edema is an indication as to when the increased feeding or the resumption of the prohibited elements is called for, especially of the proteids.

A case is reported by Hamberger,¹ of a child five years old who was given the Carlsbad cure after other treatment for dyspepsia had failed. Within nine days after treatment had begun extreme general anasarca developed. Within three days upon a diet free from salt the edema entirely disappeared. This led the writer to observe the effect of sodium chloride upon ill-nourished and cachectic children. Many children reacted who had neither heart nor kidney lesions. A large amount of sodium chloride will occasionally produce diarrhea without the development of edema. In other cases, however, both in infants and older children, as well as adults, the use of too much salt in the diet will be followed by marked edema.

Inanition Fever. A fever is sometimes observed in the newborn infant to which the term inanition fever has been given. Some years

¹ Münch. med. Wochenschrift, November 21, 1911.

ago ¹ reported 2 cases of this condition, and reviewed cases which had been reported by Holt and Tuley. The disease is considered by Hempstead.² She refers to the fact that during or immediately after birth the relatively high temperature of the child, of 37.5° to 38° falls 1.5° to 2° during the first two to six hours, and then slowly rises. During the first week the temperature varies 0.7° to 2°, and this variability must be considered physiological. A temperature of 38° in a child must be considered abnormal. Often in the middle of the first week (second to fifth day) there is fever which subsides after two or three days. Sometimes the children with this fever cry much; others are weak or drowsy, or they have little appetite. Physically, nothing abnormal is found. Stools are normal. Formerly this fever was called a sign of infection. Now the fevers due to disturbances from nourishment are considered aseptic.

The fever may be due to a change in the intestinal flora from the meconium flora to the milk flora. Germs in the intestine or their toxins may cause the fever. Winkelstein has described an alimentary fever due to biochemical-physical influences, and this transitory fever of the newborn may be of the same nature. The intestinal wall during the first days is supposed to be permeable to high molecular colloidal substances. Holt has described this fever as "inanition fever." He understands this condition as essentially the same as that which Erich Miller calls "thirst fever," and Heim and John call "salt fever." When water is given, this type of fever disappears. It has been proved recently that the concentration of tissue juices alone may not cause fever, and that in sodium chloride fever there is no lessening of the insensible perspiration. It has been suggested that the fever is a symptom of autointoxication, as the products of protein destruction or even of a nitrogen-free substance, such as salt, may, in their passage through the kidneys, cause fever.

It must be admitted that nothing very definite is known as to the origin of this transitory fever in the newborn. One or several of the above suggested factors may be its cause. The prognosis is always favorable, the fever disappearing without further consequence. The therapy is entirely symptomatic. *Give water freely.* No medicines are necessary. Luke-warm baths may be given, and the same feeding used as in non-fever cases.

Dentition. The small amount written on dentition would be a shock to the physician of fifty years ago. It is not certain that the pendulum has not swung too far, and a source of discomfort, if not disease, among children is being neglected. An urgent appeal is made in a recent editorial article³ for better care of the deciduous teeth. An extended

¹ Archives of Pediatrics, March, 1899.

² Cleveland Medical Journal, September, 1912.

³ Archives of Pediatrics, January, 1912.

study upon the relation of difficult dentition to infant mortality by H. L. Wheeler, D.D.S.,¹ is of considerable interest. The conclusions, however, are uncertain, largely because there are no records either in hospitals or dispensaries to show the relation of dentition to the death rate.

Pyelitis in Children. Pyelitis is much more common among babies than the average physician appreciates. Examination of the urine among babies is not made as frequently as it should be. This is partly due to the difficulty of obtaining adequate specimens. Methods of securing such samples have been repeatedly reported, and have been described in these pages. A continued fever, particularly if remitting in type, in a young child without clear cause should always lead to examination of the urine. There is no other condition, except typhoid fever or malaria, which will produce such a fever, and even those diseases will not cause so long-continued febrile symptoms. An excellent paper upon pyelitis in infancy is that of Edith R. Hatch.² It is vastly more common among girls than boys, and is undoubtedly due to an ascending infection, as asserted by Still.³ Among his 26 cases in one year, 23 were girls. Rigors are more common in pyelitis than in any other condition in infancy. This is another symptom which should always suggest an examination of the urine. While there may not be a chill with shivering as in the adult, the child becomes cold and pinched. A chill or rigors in young children with persistent fever have been so common in my experience that for a long time I have allowed no such case to pass without a careful examination of the urine. Fortunately urinary examination will promptly decide the question. The value of such an examination is emphasized by Bogart,⁴ of Schenectady. Routine examination of the urine of young children should be made much more frequently than is usually done by the practitioner. The purulent infections of the urinary tract in infants received extended attention in these pages⁵ last year.

Nephritis in Children. The ultimate history of children who suffer from nephritis as a sequel of acute infectious diseases is a question of considerable interest. It has been my own impression that such individuals were particularly subject to nephritis in later life. This opinion would seem to be disproved, however, by recent observations of Ernberg,⁶ who systematically examined all he could relocate of 106 persons who had had acute nephritis before the age of fifteen years, and 50 whose acute nephritis occurred between the age of fifteen and

¹ Monthly Bulletin of the New York State Department of Health, May, 1912.

² Buffalo Medical Journal, July, 1912.

³ North of England Clinical Journal, January, 1912.

⁴ New York State Medical Journal, February, 1912.

⁵ PROGRESSIVE MEDICINE, March, 1912, p. 255.

⁶ Nordiskt Medic. Arkiv., November 25, 1911.; Journal of the American Medical Association, February 24, 1912.

thirty years. The intervals since the nephritis ranged from sixteen to twenty-three years. The nephritis occurred in connection with some infectious disease in all but 27 in the first group, but in none of the 40 individuals he was able to examine were there any signs or symptoms that the kidneys were below par. The same negative findings were observed in most of the 16 relocated and reëxamined in the group of 50 older patients. Two whose nephritis had been of a subacute type, had albuminuria when reëxamined, and he thinks that their subacute nephritis was probably the beginning of chronic disease of the kidney. In 2 other cases, evidence of nephritis was discovered, but various circumstances indicated that the nephritis had developed quite recently from other causes, and not in connection with the nephritis so many years before. His experience shows further that when albuminuria persists for a time after acute nephritis, the prognosis is good and the albuminuria gradually subsides. Orthostatic albuminuria was not encountered in any of the patients reëxamined, showing that acute nephritis does not afford a predisposition for this later. All patients reëxamined were tested several times, and always in the morning.

Enuresis. One of the best articles of the year upon this very annoying condition is that of Ruhräh.¹ He reviews the various theories of its production, and quotes extensively the opinion of writers. Like most observers who have made extensive trials of various vaunted remedies, he comes back to *atropine* among drugs as the most serviceable. To be of any service it must be given in full doses. In nocturnal cases, a dose at five o'clock and at bedtime is all that is required. In cases occurring both during the day and night, Ruhräh uses a formula which I have used for many years. He prescribes a solution containing 1 grain of atropine sulphate in 2 ounces of water. Each drop of this represents approximately $\frac{1}{1000}$ of a grain, and ordinarily about as many drops will be required at a dose as a child is years old; but this is not the proper method of ascertaining the dose. Starting with 1 or 2 drops, each dose should be increased 1 drop at a time until flushing of the face and neck occurs some twenty minutes after the administration of the drug. The dose should be diminished one drop, and this should be continued until the child has ceased urinating at night, and for at least two weeks later, when the drug may be left off gradually, diminishing 1 drop at a time until 1 drop is reached, when it may be stopped.

The use of *thyroid extract* has been highly commended during the last two or three years. Firth² reports observations made upon 28 children. Of these 16 were improved or cured, and the remaining 12 showed little or no improvement. It is to be noted, however, that 12

¹ American Journal of the Medical Sciences, February, 1912.

² Lancet, December 9, 1911.

of these 16 were mentally deficient. After comparative study, Firth believes that the results were not better than those obtained by the use of atropine.

The doses given ranged from $\frac{1}{4}$ to $1\frac{1}{2}$ grains of thyroid extract per day. Enuresis is regarded as a psychosis by Wilson,¹ of New Orleans, and is treated by him by the use of bitter tonics and the faradic current.

Chorea. One of the most extensive series of observations on chorea quoted during the last year is that of Fraser.² He analyzes 300 cases, and believes that chorea is a cerebral manifestation of rheumatism. While, according to his observations, the majority of cases are clearly rheumatic, he is inclined to believe that all other cases have a rheumatic origin. Of the cases examined by him post mortem, almost every one showed endocarditis, lending strong support to the belief that chorea is rheumatic in nature. Although there is still an occasional doubter, it seems to me that the relation of chorea and rheumatism is too intimate to be doubted. Many years ago I reported³ 119 cases of chorea of which 31.8 per cent. showed undoubted evidence of antecedent rheumatism, 20.2 per cent. of concurrent rheumatism, and 13.6 per cent. of subsequent rheumatism. The relationship between chorea and rheumatism is accepted by Grober.⁴ He has experienced the same inefficiency, however, in its treatment by salicylates that other authors have. He is doubtful of the effect of treatment, and confines his efforts largely to rest, diet, and hygienic measures.

The mental symptoms of acute chorea are familiar to every practitioner, and are considered by Difendorf.⁵ They are of two types: one is of mild emotional symptoms, very common, and the other is a delirious and stuporous or paranoid condition. These are less common, but are much more serious. He believes that arsenic has no particular effect except in relieving the anemia. He, nevertheless, uses Fowler's solution. Most practitioners, I think, believe that Fowler's solution is a valuable aid in the treatment of this stubborn disorder. As sedatives, Grober uses bromide or veronal. He uses opium and its derivatives only in extreme cases. To avoid the toxic effects of arsenic, Weill⁶ incorporates the drug in fat as suggested by the experiments of Chapuis. He administers the drug in what he calls arsenical butter. He incorporates a given amount of arsenic in twenty times its bulk of milk sugar. Of this he triturates the required dose in 10 grams of butter, which is spread on bread and taken at the principal meal. The necessity for such precaution seems to me somewhat problematical.

¹ Journal of the American Medical Association, June 1, 1912.

² Practitioner, March, 1912.

³ Archives of Pediatrics, January, 1893.

⁴ Deutsche med. Wochenschrift, May 2, 1912.

⁵ Journal of Nervous and Mental Diseases, March, 1912.

⁶ Progrès médical, January 6, 1912.

Spasm of the Pylorus. Last year ¹ gave an extended review of this condition as it appears in infants. Very little has appeared in literature upon this subject this year. Graham,² of Philadelphia, presents an excellent article upon pyloric spasm in older children. His conclusions may be summarized as follows: Pyloric stenosis is present in children and young adults more commonly than is supposed, the age at which it manifests itself depending upon the degree of stenosis present. It may be latent for years, and its early recognition is important from the standpoint of early medical, or, if necessary, surgical treatment. The entire disappearance of all symptoms of congenital hypertrophic stenosis, and the apparent health of the infant during its subsequent early childhood, suggest the probability of the absorption of its hypertrophy, especially as no gastric dilatation may develop later in life.

Rachitis. An admirable review of recent advances in our knowledge of rachitis is presented by Talbot,³ of Boston. Attempts have recently been made to prove that this, as well as some of the other diseases of metabolism, are due to the function of certain glands having an internal secretion. These are the thyroid, parathyroid, thymus, and adrenal glands. These attempts have not been successful. Rachitis has been considered by some an infectious disease. Schmorl has been unable to isolate any organism to which he could attribute rachitis, except in the case of 2 rats twenty-four hours old, with a disease of the bone which was morphologically similar to a moderately severe rachitis. Negative findings are perhaps due to poor staining methods, and the difficulty of demonstrating bacteria in bones. Bacteria have been demonstrated both in culture and secretion in the epiphyses of ribs of children with rachitis who have died in the course of measles, diphtheria, pertussis, scarlet fever, and gastro-enteritis. The kind of bacteria found in such cases are often different, most prominent among them being streptococci, *Bacteria coli*, and staphylococci. In the majority of these cases, the heart blood has been sterile and the bacteria which were found in the epiphyses were not part of a general infection. It is the belief of Kassowitz that rachitis is principally a vascular change of the epiphyses, and that this change may be due to bacterial infection of the part.

Talbot quotes Pommès as saying that all newly formed bone first deposits osteoid material which later becomes calcified. This calcification goes on so quickly in health that the osteoid layer remains thin. In rachitis, the characteristic picture is one with a broad osteoid layer which is the result of some interference with the deposit of lime salts. Other writers believe that the abnormal amount of osteoid tissue in rachitis is due to the fact that calcium has been robbed from

¹ PROGRESSIVE MEDICINE, March, 1912, p. 265.

² American Journal of Diseases of Children, December, 1911.

³ Ibid., February, 1912.

the bone which was once calcified, and others that all bone substance formed during the active or florid stage of rachitis was uncalcified.

A calcium deficit in the bones in rachitis may be attributed theoretically to the following causes: (1) A primary deficit of calcium in the food. (2) A secondary deficit of calcium, there being sufficient quantity of calcium in the food. (a) It is either not absorbed in sufficient quantities for the needs of the growing bone, or (b) it is absorbed in sufficient quantity, but is excreted again in abnormal amounts. Either a considerable amount of calcium is lost as a result of an abnormal digestion, or a sufficient quantity is absorbed into the organism, but for some reason cannot be used in the bone, and, therefore, is excreted again. The rosary and enlargement of the epiphyses comes in all cases in which there is a diminution in the deposit of calcium. Such bones are easily broken. Finally, in pseudorachitic osteoporosis the abnormally broad zone of growth cannot be demonstrated under the microscope, and is always present in true rachitis. The two diseases are, therefore, best differentiated by the pathologist.

Achondroplasia. This condition is frequently mistaken for rachitis, mongolism, and myxedema. Scott,¹ of New York, reports a typical case with numerous x-ray illustrations. He asserts that the earliest published account of the disease was in 1791, when Sommering reported what was undoubtedly a case of chondrodystrophy. In 1836, Busch gave a good description of a case; but, in 1860, H. Müller gave a still better description and wider, clearer, and more intelligent observations. Urtel, in 1873, reported identical findings to those of Müller. Later, Eberth, Schidlowsky, Kirchberg, Merchand, and Kaufman cleared up its obscure pathology.

The *etiology* is very uncertain, but it is certain that the disease has nothing in common with rickets or cretinism, but like cretinism, may be due to hyperthyroidism. If the *etiology* is uncertain, the *pathology* is certain. The pathological process is a disturbance of the ossification of primary cartilage whose vascularity is increased. Strange to say, the disposition of calcium salts, no matter how great the abnormalities in the cartilage, goes on normally. The line of calcification is found to be irregular, and the formation of osteoid tissue and its ossification is typical. Moreover, periosteal bone formation is both normal and regular. In this pathological cartilage formation, the flat bones, with the exception of the sphenoid and the vertebræ, escape, while the long bones, particularly those of the extremities, suffer.

The patient presented by Scott showed the peculiarities of the disease extremely well. The large round head with its protruding parietal and frontal bases, the small pointed nose turned upward, as if it suddenly sprung from the face, are well defined. The small patulous anterior fontanelle is not seen, however. Four upper and four lower

¹ Pediatrics, March, 1912.

teeth are present. The hard palate is not high, the tongue, as in cretinism, is held between the teeth. It is not enlarged. The short arms with their apparent but not true epiphyseal "cuffing" are characteristic, as is also the so-called trident hand, its fingers short and nearly of a size. The angular separation, however, at the second joint is unobservable. The thymus gland persists, and the liver is slightly enlarged. The abdomen is large and protruding. On the lower spine a marked kyphosis is seen. The plates show distinctly the shortened humerus and femur, and the demarcation between the epiphyses and diaphyses. The skin of the lower legs is cuffed very markedly, and the musculature of the arms and legs is so weak and premature that the hand and foot, particularly the latter, can be twisted and turned at will in any direction without resistance. The plates show the femur and humerus to be shortened, but only apparently, not really, thickened.

A case was also presented by La Fetra¹ at the same meeting at which Scott's case was presented. The patient was a baby four weeks old, which had a marked degree of deformity and dystrophy. He also exhibited x-ray pictures showing the characteristic shortening of arms and legs, and a peculiar bending of the tibiæ and presented, for purposes of contrast, pictures of a normal baby three weeks old. The difference in the length of the bones was very marked, the shortening being especially noticeable in the humerus, tibia, and femur. In all the long bones the medullary cavity was seen to be wider than normal. A peculiar feature of the case was the marked exophthalmos present in both eyes.

Intestinal Infantilism. One of the best pieces of work done by the late Dr. Christian A. Herter was the exhaustive study and description of a condition which had not been well described before. His work established it as a distinct disease, with characteristic symptoms, intestinal flora, and changes in the urine. Freeman² reviews the subject and reports 4 cases.

All classifications agree that dwarfism should be divided into sexual, in which the sexual development is normal, and the asexual or infantile type, and under this latter head most cases are classified. Thus in France, Loraine has described a type of infantilism wherein the extremities are small, the head is large, and the individual has the infantile relationship in size between head, trunk, and limbs; and this condition he believed to be due to congenital lack of development of the arteries. Brissaud, on the other hand, has described another type in which the head is small, the face long, the limbs long, indeed an adult type of body. A lymphatic type has also been described in France in which the child grows very stout, and in which the child is liable to sudden death from shock. The mongolian type is familiar, and evidently

¹ Archives of Pediatrics, January, 1912.

² American Journal of Diseases of Children, November, 1911.

belongs in a category of its own. The cretin again is a distinct type of which we have full information.

In the condition described by Herter, there is an arrested development of the body. The child stops growing as it stops gaining in weight. On the other hand, the mental development is fair. Marked abdominal distention is common, often with the dilatation of the abdominal veins. There is a moderate anemia, and, what is very characteristic, marked fatigue. The intestinal symptoms are a tendency to looseness of the bowels with occasional attacks of diarrhea, often with fatty stools, although there may be but little fat in the food. They are apt to have an excessive appetite and thirst, an increased secretion of urine, and often have cold hands and feet. The most interesting feature is an examination of the feces. There is an absence of the ordinary intestinal flora of the intestines of young children. The dominant organism present are Gram-positive organisms. The prevailing organism is the *Bacillus bifidus* of Tissier, an organism of the sort observed by Escherich in an epidemic of diarrhea in a hospital. With this, Herter finds two others, *Bacillus acidophilus* and the *Bacillus infantilis*, which later may be a variation from the *Bacillus bifidus*. The *Bacillus coli* and the *Bacillus lactis aërogenes* are frequently found during the active stage of this disorder. The urine also shows characteristic changes. The amount passed in twenty-four hours is large. There is a rise in the ethereal sulphates, a pronounced indicanuria and excessive phenol, and the presence of a large amount of aromatic oxyacids.

The real nature of this disturbance is a matter of speculation. Dr. Herter expressed himself as feeling that it might be due to some lack of function in the pituitary body, and, to determine whether this might be the case, radiographs have recently been made in some cases, but with negative results. To Freeman, it seems more likely that it is due to some damage to a part of the digestive system that has to do with the absorption of food. These patients have good appetites, take food and water eagerly, but have large, poorly digested movements, with a waste of fat. These cases might be thought of simply as stunted growth, but it would seem, considering the previous history of diarrhea, the evidence of intestinal putrefaction, with the peculiar flora of the intestines, and the ethereal sulphates in the urine, that the lack of growth is really due to an intestinal condition that interferes with a proper absorption of food in the bowels, and this interferes with an increase in weight. The intestinal infantilism of Herter is not a very infrequent condition in young children, who for a considerable period will not grow or gain in weight, although the hygienic surroundings, feeding, and supervision are most carefully managed.

Extensive studies have been made upon the subject by McCruden and Fales,¹ of New York. They present several theories for the

¹ Journal of Experimental Medicine, February, 1912.

production of the condition, neither of which are as yet positively established. The same authors¹ in a later paper report balance studies of nitrogen, sulphur, phosphorus, calcium, and magnesium in intestinal infantilism. They found the absorption of these elements from the intestines to be very poor, and their excretion in the urine to be slight. Valuable conclusions will undoubtedly soon be drawn from work of this character. The case of a boy, aged twelve years, suffering also from rachitis, anemia, and tuberculosis is reported by Biehler.² This author believes that the conditions have some relation with the ductless glands. Cases are reported by Hewlett³ which seem to show that when the condition is associated with disease of the pituitary gland it resembles the Brissaud or Loraine type of infantilism.

Exudative Diathesis. The attitude of the profession during the last two or three decades upon the subject of diathesis has been somewhat peculiar and interesting. That certain individuals show certain well-marked tendencies every practitioner acknowledges, but he has become very cautious of giving it a name. Of late, considerable has been said about an exudative diathesis, apparently a new name for a long-recognized condition. In a recent editorial⁴ the subject is discussed with great good judgment. The lukewarm attitude, often carried to open hostility, of the German medical savants of a generation ago toward the diathetic interpretation of the phenomena of disease by French and English practitioners is probably not fully realized today. With the advent of the germ theory the diathesis idea was temporarily side-tracked, so that the present generation has grown up largely in ignorance of the old controversies. It knows that there are certain predispositions which make tissues a superior culture medium for germs of various kinds. It also knows that certain anomalies of metabolism are now regarded as actual diseases and not simply as conditions which invite disease. Hence the conception of diathesis has become in part superseded through the natural march of scientific discoveries.

It therefore appears singular that while other countries, including France and Great Britain, have been writing less and less of diathesis, Germany should be the one to rehabilitate the idea. The pathologists of Germany and Austria never denied the existence of a predisposition to constitutional diseases. Kasper⁵ traces the history of the new diathetic teaching in Germany. It appears that Comby, in 1900, postulated the existence of a single infantile diathesis which predisposed to the greater part of chronic infant morbidity. A single diathesis is evidently a great improvement over half a dozen with hair-splitting distinctions. The connection of this diathesis with tender years made

¹ Journal of Experimental Medicine, May, 1912.

² Archives de médecine d'Enfants, January, 1912.

³ Archives of Internal Medicine, January, 1912.

⁴ Medical Record, August 31, 1912.

⁵ Münchener med. Wochenschrift, July 30, 1912.

it possible to trace its presence during the old age and maturity of the subject. But out of Comby's one diathesis the German pediatricists have made at least two, viz., the spasmodic and exudative, which, however, may readily coexist in one individual. The exudative diathesis of Czerny has made good in medicine, Kasper states. He has shown that with the most faithful care certain children have developed "milk-crust" on the scalp and face (the adjective "exudative" is based on this phenomenon), and that a little later the same children have their anginas and false croups, enlarged tonsils, and adenoids. These children are not rendered secure by breast-milk, and go from one ailment to another. They make up much of the pedatrophs class. They bear measles and vaccination badly. Scrofula is the exudative diathesis plus the action of the tubercle bacillus. As to the nature of this condition, Czerny believes it due to defective metabolism of fat. The way to proceed against it is summed up in two words—proper diet. These children do best by cutting out fat as far as possible, and making free use of carbohydrates. The diet is almost vegetarian. Even milk and eggs are forbidden. Upon this diet, the improvement is striking. The resistance to disease and the general appearance promptly improve.

According to Schrieber¹ the exudative diathesis is merely a new name for the old conception of the gouty tendency in children—infantile arthritism. The primary manifestation of it appears in the skin, mucous membranes, and lymph organs and glands, but an array of secondary disturbances are liable to manifest themselves sooner or later. Rosenstern has recently called attention to hypereosinophilia as a constant phenomenon in all children with the exudative diathesis. When the lymph apparatus is predominantly involved, the condition might be called lymphatism. Such children are peculiarly disposed to lesions of the skin, mucosæ, and lymph apparatus. When these lesions are the work of ordinary microbes they run a rapid course, but, when the tubercle bacillus is involved, the course of the attenuated tuberculosis is torpid and protracted, corresponding to the old picture of scrofula. As the diathesis is hereditary, the marriage of persons with a similar diathesis should be discontenanced. During pregnancy, special care should be paid to hygiene, and the children should be watched for the first manifestations of trouble in the skin, mucosæ, or lymph apparatus, with treatment as they develop. The main point of prophylaxis and treatment is diet, and this has to be tentatively regulated in the individual case. Comby permits eggs, vegetables, cooked fruits, and salads; Czerny excludes even eggs and milk. A change of scene is often of wonderful benefit, eczema or asthma vanishing when the child is sent to the country or to the mountains; the seaside is particularly useful when the lymph apparatus is mainly involved.

¹ Archives de médecin d'Enfants, June, 1912; Journal American Medical Association, July 27, 1912.

A course of mineral waters on the spot may prove useful, and also arsenic and cod-liver oil. But the iodides should be avoided because, although they have an unquestioned action on the lymph apparatus, they induce hyperemia, and are thus liable to produce disturbances of the skin and mucous membranes.

Adenitis. Inflammation of the cervical lymph nodes is the subject of an excellent paper by C. N. Dowd,¹ who has probably had a larger experience with such conditions in children than any other American surgeon. He believes that children under two years of age do not often have tubercular disease of the neck lymphatics; when they do have it they show less resistance than older children do. Between the ages of two and seventeen years, tubercular lymphatic disease in the neck is fairly regular in its course. Variations are hardly seen in larger proportion than in such disease as typhoid fever and pneumonia. This is the period when the upper nodes usually break down before the lower nodes are extensively involved. A definite clinical picture is thus formed. In adult life the breaking down of the upper nodes is not so likely to occur; the infection spreads downward and involves the lower nodes, thus presenting a clinical picture and a problem different from that in children. The author and his associates and assistants, working in St. Mary's Hospital for Children, Roosevelt Hospital, and the General Memorial Hospital, have operated upon 465 cases of tubercular disease of the neck lymphatics. In the entire group, there were only 15 below the age of two years. These 15 patients showed less power of resisting tuberculosis than the other groups. This group differs very materially from the group of older children. Possibly cases of this kind have led to the opinion, still held by many, that neck tuberculosis is only one manifestation of general tuberculosis; an opinion which cannot be held by those who study the other groups. Possibly the susceptibility of young children to infection by the bovine type of tuberculosis is one element in the peculiarities shown by this group. The clinical manifestations in the period which follows the age of two years are of great importance. This is the period in which most of the cases come to the surgeon. In this period of life, the nodes have a tendency to break down in the upper part of the neck, before they extend downward as far as they do either in adults or in very young children. Most of the cases are brought on account of a lump, which is not really a swollen node, but a cold abscess. One of the subparotid nodes breaks down and discharges its detritus, which, following the course of least resistance, forms an abscess which points sometimes in front of the sternomastoid muscle, and sometimes behind it.

The real lesion is tuberculosis of a moderate sized group of lymph nodes which have received their infection from the pharynx, mouth,

¹ Surgery, Gynecology, and Obstetrics, April, 1912.

or other part of the head. They become enlarged according to a definite sequence, and in part have become caseous and the caseous material has broken through the node capsule before the lower lymphatics of the neck have shown infection. Here we have a condition which probably presents the most favorable field there is for the surgical treatment of tuberculosis. A thorough operation can usually be done in less than an hour, the patients are usually out of bed on the third day, although some of the wounds heal slowly. The resulting scar can hardly be seen if it is properly placed.

The third group, the adults, present still a different type of tuberculosis of the lymphatics. The infected lymph nodes, instead of caseating in the upper part of the neck before the lower part is involved, are apt to extend through the entire side of the neck, so that the lower nodes become enlarged as soon as the upper ones. Such nodes show little tendency to become caseous but are infiltrated with tuberculosis throughout their entire extent. The condition is more serious than that of the preceding group; there is less likelihood of the spontaneous limitation of the disease.

The importance of peripheral glandular disease during early life is emphasized by Ssokolow.¹ The submaxillary and cervical glands are more frequently involved. The third in order of involvement are the lymph nodes of the abdomen. These disorders may be acute, subacute, or chronic. The causes of involvement are varied, but the most common of all causes is tubercle bacillus. Other germs commonly found are streptococcus, staphylococcus, pneumococcus, influenza bacillus, and the pertussis microorganism. Colon and typhoid bacilli are those usually found in the mesenteric lymph nodes. While diagnosis of the affections of the superficial nodes is comparatively easy, involvement of the deep-seated nodes often produce symptoms that are very obscure. Prolonged fluctuating temperature may be the only symptom, tenderness and swelling being impossible of detection. In considering treatment, the author advises against incisions and massage, or any measures which will favor reabsorption, and he advises against incision before suppuration has been completely effected. He believes in the use of heat in the form of poultices as a useful measure.

J. B. Stone² adheres to the accepted belief that cervical adenitis is secondary to some primary focus of infection. The rational treatment, therefore, is to remove the primary cause, if possible. When suppuration has occurred, however, and the glands have broken down, the secondary lesion must be treated surgically. Ruhräh³ reports an epidemic of sore throat with excessive involvement of the cervical lymph nodes. Bacterial study demonstrated a streptococcus in short chains in which

¹ *Archiv f. Kinderheilkunde*, June, 1912.

² *Boston Medical and Surgical Journal*, October 17, 1912.

³ *American Journal of Diseases of Children*, November, 1912.

the diplococcus arrangement was preserved. Extended observation of these cases led to the belief that a streptococcus infection may be caused by infected milk, and may be exceedingly severe and attended with numerous complications and fatalities. Even in cold weather milk may be the source of such infection. The milk supplied to cities, he believes, should be pasteurized, and where by accident the dairy company cannot properly pasteurize its milk, it should be compelled to notify its consumers, so that they can either pasteurize or boil the milk.

Delayed Development Treated with Thymus Gland. The physiology of the thymus gland is imperfectly understood. No one of the ductless glands appears to have a more active part in the economy, especially in the early years of life, and still its complete removal is not accompanied by those striking manifestations which follow the removal of the thyroid or adrenal. It cannot be concluded, however, that because the removal of a gland is not followed by an acute death, it plays no important part in nutrition. The evidence afforded by the removal of the sexual glands is proof on this point. The laboratory investigations, however, are not altogether in accord. Certain points seem to be fairly well established. The thymus remains in active service during the presexual life of an animal, but with the onset of maturity it undergoes a retrogression which amounts almost to atrophy. The second point in which there seems to be some agreement in the experiments, is in relation of thymus removal to the development of the skeleton. While thymectomy is not followed by acute death, the animals subjected to it do not, in many cases, grow to the same size, have the same strength, or show the resistance to infection exhibited by controls. The bones are of a smaller size and are softer; the epiphyseal line is broader and more irregular, compared with controls. Kerley and Beeby¹ report the case of a boy, aged sixteen years, treated with thymus glands. The boy was physically completely undeveloped. As there has been no active substance found in the thymus similar to adrenalin or iodothyrim, for therapeutic purposes the whole gland was administered. Until thymus implantation is perfected, or until the active principle is discovered, such a method seems the only one available. In the eighteen months during which this boy was under treatment there was a gain of three inches in height after he was seventeen years, and 19 $\frac{1}{4}$ pounds in weight, when there had been no gain for two years and nine months before. Six other cases of slow growth or retarded development were under observation at the time of writing. These cases will be reported later, and will help to establish the point that naturally will arise in the reader's mind whether or not the thymus was operative in the case reported or whether it is to be looked upon as a coincidence, and the phenomena would have taken place without its use.

¹ American Journal of the Medical Sciences, August, 1912.

Vomiting in Infants. The significance and treatment of vomiting in infants and children is the subject of a paper by Lowenberg,¹ of Philadelphia. He refers to the regurgitation common in infants due to the fact that the stomach is covered by the large left lobe of the liver, which cannot, when the stomach is filled, help but interfere with the rapid emptying of its contents through the pylorus. It becomes less frequent after six months, as increase in the greater curvature is then marked. The only preventive treatment is regularity of feeding and the avoidance of excessive amounts. He believes that irregular feeding and overfeeding are responsible for the vast majority of cases of functional vomiting occurring under one year both in the breast-fed and the bottle-fed. Simple regurgitation may easily become true vomiting.

There are other types of vomiting in which the food is at fault. The vomitus due to excessive fat is distinctly sour and acid, smelling like rancid butter. It contains lumps of coagulated casein, holding within their meshes the fermenting fat which is soluble in ether and reacts characteristically with osmic acid. These pieces of curd are large or small, and have a yellowish appearance. The time of vomiting in this condition is important, occurring from one hour to one and one-half hours after feeding; that is, after fermentation has occurred. The vomiting due to excessive feeding or overfeeding, on the other hand, occurs immediately after feeding, the vomited matter being, as a rule, unchanged and frequently uncoagulated. The remedy, if in the breast-fed, is to attempt the reduction of the fat percentage by modifying the mother's milk. This is, as a rule, more readily accomplished than to increase the percentage where the fat is too low. The free drinking of water by the mother, the partial, or complete, exclusion of milk, soup, malt liquors, and meat from the dietary, increase in exercise, and the occasional use of a laxative are measures well calculated to accomplish the result desired. While this is being accomplished the infant should receive a purge of iced castor oil. Stomach washing, done once or twice, is occasionally needed. This applies with greater force to the bottle-fed. Each nursing should be preceded by an ounce or two of some cereal water, preferably made from barley or wheat. In rare instances where it is impossible to reduce the fat, the breast milk may be withdrawn and diluted with a cereal water and fed from a bottle. Very rarely the breast milk may be withdrawn and pancreatized. Any of these maneuvers, alone or in combination, will usually suffice to overcome the condition in breast-fed babies.

In bottle babies, as a rule, the problem is simpler. Here, following the initial purge and stomach washing, the infant is fed for twenty-four hours on some cereal water. The physician may then, by one of the

¹ Journal of the American Medical Association, January 20, 1912.

various methods of milk modification, so adjust the fat percentage as to suit the infant's digestive capacity. This failing, resort may be had to pancreatization or whey feeding temporarily. When vomiting continues, and no fat appears to be tolerated, we may employ with success modifications of skimmed milk, buttermilk, or condensed milk. Sodium citrate added to the formula in the strength of 1 to 2 grains for every ounce of milk and cream in the mixture may aid in overcoming vomiting. Sugar is rarely a cause of vomiting, but it may be. When it is a source of trouble, it is not uncommonly associated with a watery diarrhea. The vomitus is watery, sour, and hot; it occurs late after feeding and may cause crying, as the regurgitated material may produce a burning pain in the esophagus.

Eastman¹ reviews the anatomy and physiology of the infant's stomach but believes that vomiting in breast-fed infants is usually due to high percentage of fat. This is commonly due to lack of exercise and over-feeding on the part of the mother. In bottle-fed babies there are many cases of persistent vomiting as the result of too strong a formula. There are, however, certain cases of marasmus in which there is a lack of muscle tonus, often increased by persistent use of too dilute a formula.

E. B. Smith² believes that there is a type of vomiting which occurs in nervous children at about the time of the second dentition. It is not periodical, and is prone to occur during or immediately after a meal. A neurotic hereditary history is frequently obtained, and the patient is liable to have some functional disorder, such as enuresis or habit spasm. The condition is probably due to hyperexcitability of the stomach, either hereditary or acquired, and is similar to the bladder irritability of enuresis. Firm moral control and removal from unfavorable surroundings are important in treatment. As to medication, Smith advises the use of minute doses of arsenic and opium in certain cases.

The use of a duodenal catheter in the diagnosis and treatment of certain cases of vomiting in children is the subject of an extended article by Hess.³ He asserts that in infants it is possible, without difficulty, to insert a soft rubber Nélaton catheter (No. 15 F.) past the pyloric sphincter and into the duodenum. The catheter is introduced in the same way as the ordinary stomach-tube, and, after some experience is acquired, the technique employed is almost as simple. It differs from previous duodenal catheters in that it does not depend on gravity or peristalsis to direct it to the pylorus. The mere force of inserting it propels it along the natural course of the food to the pyloric opening. This fact not only enables it to be introduced easily and surely, but it gives to it the additional advantage of a pyloric probe with which

¹ Boston Medical and Surgical Journal, August 15, 1912.

² Lancet, December 23, 1912.

³ American Journal of Diseases of Children, March, 1912.

we may test the tonicity and irritability of this sphincter. Radio-graphs show that the catheter invariably, on entering the stomach, bends sharply to the left to reach the fundus, and that therefore, the more vertical position of the stomach of the infant, does not account for the ease with which the catheter is entered. It is probable that others unknowingly have entered the intestine by this method, and that in many instances reports as to the contents or capacity of the stomach in infancy, have been subjected to this source of error.

This catheter enables us to readily diagnose pylorospasm, and differentiate it from vomiting due to other causes. In the case of spasm, we meet with resistance encountered at the same point whenever we attempt to advance the catheter; this is frequently accompanied by irritability of the pylorus. The spasm may be felt to relax suddenly and enable us to enter the intestine. Marked pyloric stenosis can be diagnosed from the failure to transgress the pylorus after repeated attempts. A mild degree of stenosis, so slight as to allow the passage of the catheter, cannot be differentiated from simple spasm. Cardiospasm frequently accompanies pylorospasm. This has been overlooked, due to the too forcible insertion of the stomach-tube.

If a soft rubber tube, such as was originally used, is introduced into the esophagus, it may be found even impossible to enter the stomach. Frequently, as the result of this spasm, the food does not enter the stomach, being checked at the cardia. As a marked gastric secretion is often associated with pylorospasm, so also is an increased duodenal secretion (duodenal succorhea). This secretion is found to contain protease, lipase, and amylase to a marked degree, so that in this connection we may speak of a pancreatic hypersecretion or succorhea. There are cases of cardiospasm and pylorospasm unaccompanied by increased gastric secretion. In a case of this kind there is likewise no increased pancreatic secretion. The catheter is of value in the therapy of pylorospasm. Its passage through the pylorus seems to relax the ring, and in this way to diminish the vomiting. It would seem of advantage to test this way of dilating the pylorus and to pass the catheter frequently in such cases.

Infant Foods. Until very recently the attention of pediatric investigators was directed almost entirely to the fats, proteids, starches, and sugars in their consideration of infant foods. Quite recently the mineral salts have been studied and evidence regarding their importance has been somewhat surprising. In investigating the cause of tetany, Grulee,¹ in this country, has called attention to the part played by the salts in the food, particularly the calcium salts. In an article recently read before the New York Academy of Medicine, but not yet published, he strengthened the belief that these salts may play an important part in the infantile economy. As in many other instances, such conclusions

¹ Archives of Pediatrics, January, 1912.

drawn from the study of infancy, would seem to lead to the belief that they are important in the adult economy as well. The importance of the mineral salts in the metabolism problems of infants is so far recognized by Hoobler¹ that he has arranged a dietary list showing the food values in mineral salts of the phosphorus, potassium, sodium, iron, sulphur, chlorine, magnesium, and calcium containing foods. An editorial article² in the same journal reviews the question and calls attention to the long neglected importance of the mineral salts in food.

The use of maltose in the dietary of infants has received considerable attention during the last year. Finkelstein asserts that sugar may cause fever, and, in fact, has considerable to say about the "sugar fevers." The comparative effects of lactose, saccharose, and maltose are not yet scientifically determined. It has been claimed that the lactose of cow's milk is not identical with that of human milk. This is denied by Morse,³ who asserts that there is no convincing evidence in favor of such claim. No differences having thus far been found in the chemical composition of lactose from different sources, it seems more reasonable, therefore, to consider them identical until they are proved not to be. He carefully reviews the recent theories of Finkelstein and Meyer, who believe that the diarrheal diseases of infancy originate in a functional weakness of the intestine; that this functional weakness is kept up by fermentation and increased by it. Neither normal nor abnormal acidification can take place without it. The fat is never involved primarily. It is injurious in that it causes an acid fermentation. The fermentation of the sugar is dependent on two main factors: The concentration of the whey, and the relative proportions of the casein and sugar in the mixture. They conclude, therefore, that the principles on which a food to combat intestinal fermentation depend are: A diminution of the quantity of milk sugar; a diminution of the salts through dilution of the whey; and an increase in the casein, with varying and, under certain circumstances, not inconsiderable amounts of fat. They consequently developed a food to meet these indications, to which they gave the name of "Eiweissmilch." This food is prepared with precipitated casein and buttermilk, after which it is boiled. Its composition is: Fat, 2.5 per cent.; lactose, 1.5 per cent.; proteid, 3 per cent.; salts, 0.5 per cent. They claim that with this mixture the loose green stools are quickly replaced by typical soap stools. One quart of this milk contains, however, only about 370 calories. Babies taking it, therefore, suffer from lack of nourishment. They advocate, therefore, the addition of malt sugar or the dextrin-maltose preparations to the mixture after the disappearance of the acute symptoms, in order to avoid loss of weight

¹ Archives of Pediatrics, March, 1912.

² Ibid.

³ American Journal of the Medical Sciences, November, 1912.

and disturbance of nutrition. They claim that, on account of its more rapid absorbability, maltose does not cause a recurrence of the symptoms of fermentation. Their arguments point strongly to sugar as the etiological factor in intestinal fermentation. Their treatment of fermentative conditions with a food low in sugar and high in proteids is, therefore, a rational one. The substitution of dextrin-maltose mixtures for lactose also seems rational. It does not seem rational, however, to treat all cases in the same way or to give all babies the same food without regard to their digestive capacities. The lactic acid in the buttermilk also seems irrational in that it is one of the products of the fermentation of lactose, and, therefore, presumably one of the substances causing the disturbance in the intestine. It seems wiser to take advantage of the main principles of this method of treatment of the intestinal fermentative conditions and avoid the disadvantages of a routine food and the unnecessary, if not harmful, lactic acid. It is possible by using mixtures of precipitated casein, prepared according to Finkelstein and Meyer's method, water, and cream, to obtain any desired percentage of fat and casein with extremely low percentages of lactose and salts. Any of the dextrin-maltose preparations can then be added in any quantity desired.

The use of this method of treatment in a considerable number of cases during the last year has convinced Morse that there is a variety of intestinal indigestion in infancy which is relieved by reducing the sugar and salts in the food to a minimum, and giving large amounts of casein, and that the dextrin-maltose preparations may be given to these patients sooner than lactose without causing a return of the symptoms. This type of the intestinal indigestion may be either acute or chronic, and is characterized by an increased number of stools of diminished consistency, green in color, often frothy, acid in reaction, and not infrequently containing mucus and fat curds. Unfortunately, however, precisely similar stools may be seen in other conditions in which the trouble is due primarily to bacteria, in which this method of treatment may do no harm. It is to be hoped that with increasing knowledge of the bacteriology of the intestinal tract in infancy some simple methods will be evolved which will make it possible to readily differentiate between the diarrheas due primarily to chemical changes in the intestinal contents and the disturbances of the digestive functions dependent on them, and those due primarily to bacteria. At present it is extremely difficult to distinguish between them, and correspondingly hard to know how to treat them.

There is a type of diarrhea in infancy usually characterized by watery, green, foamy irritating stools, but sometimes with discharges of mucus and blood, which is associated with the presence in the intestinal contents of large numbers of bacilli belonging in the group which

includes the *Bacillus perfringes* and the gas bacillus. These organisms ferment the common disaccharides and liberate considerable amounts of butyric acid. Large amounts of sugar are, therefore, contraindicated in this group of cases, maltose being more harmful than lactose, because it undergoes butyric fermentation more readily. This type of diarrhea yields more rapidly to buttermilk and mixtures containing living lactic acid bacteria with a small amount of lactose. The lactic acid forming organisms kill out the pathogenic organisms. Being themselves fermentive organisms, they cannot develop in a protein medium. A moderate amount of lactose must be present in the food. Morse very wisely concludes that lactose is, for many reasons, preferable to maltose for the feeding of normal infants. There is a type of intestinal indigestion due to the fermentation of sugar, in the treatment of the convalescent stage of which maltose is better borne than lactose. Maltose is contraindicated in the treatment of diarrheas, due to the gas bacillus and similar organisms, and is less useful than lactose. Maltose is contraindicated in the treatment of those caused by the dysentery bacillus.

Much has been written during the last year upon the method of Finkelstein, more perhaps than upon any other point in artificial feeding. The above opinions from so authoritative a source as Morse are, no doubt, as near the truth as we can at present attain.

For years pediatric authorities have contended with one voice that milk is the best substitute food for young children. In writing upon the subject of milk as an infant food, Abt¹ very wisely calls attention to certain requirements necessary for successful feeding with this element. A knowledge of the physiology of food, the injuries produced by food, and the tolerance for food, is requisite. Overfeeding is as disastrous as underfeeding. An excess of fat or sugar is capable of producing toxic symptoms. Simple milk mixtures, that is, milk diluted with water or cereal decoction, with the addition of 1 to 5 per cent. of sugar, will, in most cases, give satisfactory results. Elaborate and complicated milk formulæ are not ordinarily required. The technique of feeding consists of careful preparation and proper administration of the food. These are not the least important elements of successful feeding. In feeding sick infants it is frequently possible to ascertain which element in the milk mixture is producing harm, and the proper modification may be made. Every baby, especially every abnormal baby, is a law unto himself, and should be studied as an individual. No one's dictum, rule, or recent discovery is as important as a knowledge of general principles of feeding, and the physiology of food and digestion. Prolonged starvation lowers resistance and predisposes to disease and death. Prolonged and excessive use of laxative drugs does

¹ Chicago Medical Recorder, March, 1912.

not assist in the digestion or assimilation of food. Scalded or boiled milk sometimes agrees when raw milk causes indigestion and diarrhea. An infant may be difficult to feed because he is suffering from an inherited disease, an anatomical malformation, a constitutional vice, or an infectious disease. Fresh air, intelligent care, good housing conditions, frequent bathing and cleanliness, proper clothing for summer and winter, are powerful adjuvants in all that pertains to normal digestion and the upbuilding processes of infants.

RHINOLOGY AND LARYNGOLOGY

By GEORGE B. WOOD, M.D.

THE nose and throat literature of the twelve months past compares very favorably in quality and quantity with that of the former years. There is, as always, quite a large amount written either for the purpose of self-advertisement, or as a digest of established facts and containing no new thought. Digests of this type are frequently very useful, however, as they bring important data before their readers in an easily assimilated form. The best articles of the year have had to do with the development of operative technique. While this is valuable and essential it is to be regretted that more original work has not been done along the scientific side of laryngology and rhinology, especially concerning pathology and bacteriology. There is a large open field for investigation along these lines in nose and throat work, particularly for those who have the opportunity of studying a large amount of material, and who have laboratory facilities. The nose and throat specialist is, of course, essentially a clinician and knows little of laboratory technique, but there ought to be more working together of the clinician and the trained laboratory investigator. This coöperation is essential if we are to settle important and difficult problems scientifically, such as the physiologic role of the tonsils, the value of autogenous vaccines, the relative value of the different parts of the upper respiratory tract in cryptogenic infections, the etiology of laryngeal tuberculosis, and many more mooted problems that have been well and thoroughly studied from their clinical side.

Anesthesia. The question of the choice of the anesthetic in nose and throat operations, especially those on the tonsils, has again been brought out in controversy by an article by Dr. Charles P. Grayson.¹ Dr. Grayson, in this paper, strongly advised the use of *chloroform* as the anesthetic of choice in the removal of tonsils and adenoids. In his hands it seems to have been a safe and certainly a pleasant anesthetic. On the other hand, however, the majority of opinions, as expressed in the discussion, were that chloroform was a dangerous anesthetic.

In a recent article, R. E. Apperly² published a series of experiments undertaken to determine the extent and nature of the injury done to

¹ Transactions of the American Rhinological, Otological, and Laryngological Society, 1912.

² British Medical Journal, September 14, 1912, No. 2.

the cells of the liver and kidneys, (1) by an acute infection; (2) by chloroform and ether; and (3) by a combination of the two, and finally a short series of experiments were carried out with the object of showing the value of glucose in combating the symptoms caused by such agents. After the first series, experiments with ether were discontinued, as the findings obtained were almost negative and merely bore out results which had already been pretty well established. He found that chloroform has not only a profound effect on the cells of the liver, but that it has an almost equally harmful effect on the cells lining the tubules of the kidneys, which latter fact, he says, has never been sufficiently emphasized. Chloroform, therefore, not only acts on the liver cells and interferes with the metabolism of fats, thereby throwing out into the blood the poisonous fatty acids which cause acid intoxication, but, by its injury to the kidney, interferes very seriously with their chief means of elimination. Ether, even in very large doses, does not harm the cells of the liver and kidneys to anything like the same extent. The changes following chloroform anesthesia were greater the higher the percentage of chloroform in the blood.

The report of the committee¹ on anesthesia of the American Medical Association goes so far as to say that the use of chloroform and mixtures containing it is no longer justifiable for major operations, also that in minor operations it were best to abandon its use.

It would seem that the dangers of chloroform have been so well proved that nobody is justified in using this drug for anesthetic purposes when ether can be obtained or is not contraindicated. We cannot, however, agree with the findings of the Committee on Anesthesia when they practically, by inference, recommend anesthesia in tonsil operations by the continuous method. They point out the disadvantages and danger of what they term intermittent anesthesia. It has been shown that carbon dioxide is the best respiratory stimulant that can be obtained, and that when the anesthesia is for a few minutes removed this gas is exhaled more rapidly than it is produced, so that a compensatory period is liable to follow in which all spontaneous breathing ceases. The committee believes that certain deaths which occur in operations may be explained by the absence of carbon dioxide in the blood in sufficient quantities to stimulate respiration so that there is an insufficient quantity of oxygen to preserve life. While we have not had any experience with intratracheal insufflation, we have seen several alarming cases of incipient heart failure in which anesthesia was kept up by insufflation into the mouth of warm ether vapor. The committee suggest as a very good and efficient respiratory stimulant, the inhalation of oxygen containing 8 to 10 per cent. of carbon dioxide. This can be used from an ordinary gas tank, and should

¹ Journal of the American Medical Association, 1912, lciiii, 1909.

be administered as soon as there is any sign of cardiac or respiratory failure.

Ethyl chloride as a general anesthetic is not as free from danger as has been frequently supposed. Neilson¹ reports a case of a boy, aged seven years, who suddenly collapsed within a half-minute after anesthesia was started for operative work on the tonsils and adenoids. The child was revived by artificial respiration.

LOCAL ANESTHESIA. The use of local anesthesia in operative work in the nose and throat is becoming more general, and filtration anesthesia is being gradually preferred over simple applications when there is much operative work to be done.

Luc² gives an injection of morphine about one hour before operating in all cases where he uses local anesthesia. In septum work he produces superficial anesthesia with a 10 per cent. solution of cocaine, and then injects novocaine with adrenalin. In the removal of polypoid hypertrophy of the inferior turbinal he prefers the injection method in that it prevents the decrease in size which always follows the application of cocaine and adrenalin and which makes the application of the snare difficult. For operative work on the sinuses, he employs the indirect method or nerve blocking. He reaches the ethmoidal branch of the nasal nerve in the following manner: A needle is passed along the superior internal angle of the orbital cavity to a depth of a little more than 2 cm. At this depth the point of the needle ought to be in relation with the anterior ethmoidal foramen through which the nerve passes, and here the injection is made. The superior maxillary nerve must then be anesthetized at the level of the sphenopalatine ganglion. To do this a strong needle is passed through the skin, holding it perpendicular to the surface under the inferior edge of the zygomatic arch, at a point where the edge is intersected by a line drawn vertically downward from the posterior edge of the external orbital process of the malar bone. The needle is then directed slightly upward and inward toward the lower edge of the nasal bone, and pushed to a depth of about 4 cm. At this point several drops of the solution are injected to reduce the pain of manipulation in this region so richly supplied with nerve filaments. The superior maxillary nerve itself is reached about 1 cm. deeper, and here the rest of the solution is injected. After 20 minutes the operation may be begun. Of late, however, except when he is going to operate extensively on the antrum, he has given up the nerve blocking of the superior maxillary nerve, but still systematically resorts to the infiltration of the nasal nerve. The posterior region of the nose is anesthetized by surface applications. In operations for the removal of the tonsils under local anesthesia, the pillars should be infiltrated and then an injection made with a

¹ Ugeskrift for Laeger, Copenhagen, April 18, 1912, vol. lxxiv, No. 16.

² Laryngoscope, 1912, vol. xxii, No. 5, p. 707.

curved needle directed outward between the inferior extremity of the tonsil and the base of the tongue. Here the outer wall of the tonsil cavity is easily encountered, and an injection at this place reaches the nerve filaments before they enter the tonsil.

Probably the best description of the *technique of regional anesthesia* in rhinolaryngology is that by Jules Broeckhaert.¹ In regional injection of the nasal nerve, Broeckhaert calls attention to the fact that the needle, after piercing the skin in the supero-internal angle of the orbit, seems at first to enter a free space. It should then be made to penetrate between the bone and the periosteum, the needle scraping the surface of the bone. In this way it is inserted to a depth of between $2\frac{1}{2}$ to 3 cm. As it advances, the liquid being injected as it goes along, the point of the needle is inclined successively up and down so as to insure contact with the nerve trunk which passes horizontally between the periosteum and the anterior ethmoidal foramen. He says that by experience one learns to recognize the sensation of the needle in contact with the nerve.

In the regional injection of the superior maxillary nerve, Broeckhaert prefers the route by the orbital floor. The needle is inserted immediately above the inferior margin of the orbit about 1 cm. from its infero-external angle. As it is advanced, care must be taken to direct it a little outward and to make it scrape along the bony floor of the orbit until the finger pushing the syringe can feel that the needle has penetrated into soft tissue. From this point onward it is in the sphenomaxillary fossa which it traverses from before backward along the nerve trunk. The outward trend of the needle should be maintained as far as this point. It is important not to exceed a depth of 4 cm., because to pass deeper would be to overreach the mark, which is Meckel's ganglion.

There is no doubt that the anesthesia following infiltration is much more complete and is accomplished with a great deal less cocaine or other anesthetic than by any other method except possibly nerve-blocking. It does, however, seem that nerve-blocking is rather impractical in nose and throat work. Luc's proposal, as thus stated to reach the superior maxillary nerve, seems in itself to be an almost major operation, and certainly not free from danger. With less force the same can be said about the injection of the nasal nerve in the orbital cavity as the difficulty of thoroughly cleansing or rendering aseptic the skin just above and to the inside of the eye, makes it possible for an infection to start in the orbital cavity. For the purpose of surface anesthesia, cocaine is probably the most reliable drug. It must, however, be used with caution as it is also the most toxic of the local anesthetics. For injecting purposes, novocaine with adrenalin, as recommended by Luc, or eucaine with adrenalin, will both produce complete anesthesia,

¹ Journal of Laryngology, Rhinology, and Otology, October, 1912, vol. xxvii, p. 524.

and that in small doses, and being much less toxic than cocaine are to be preferred where any extensive area has to be infiltrated.

Pharmacology. There has been little during the last year of great addition to the pharmacology of the nose and throat.

Hexamethylenamin, which goes under the commercial names of urotropin, formin, etc., is becoming more widely recognized as a method of combating infections in the upper respiratory tract. Investigations by E. Zack¹ corroborate the early work of Goodman concerning the elimination of formalin in the saliva and bronchial secretions after the ingestion of hexamethylenamin. He has shown that even minute amounts of the drug in the sputum arrest its putrefaction and, also, his experiments show that the drug may possibly pass into the eye, although he doesn't regard his test as conclusive along this line.

Differing somewhat from Zack's findings, Burnam² has examined the bile, sputum, saliva, and cerebrospinal fluid, and finds that even after rather large doses of hexamethylenamin there appears in these fluids only traces of the drug, certainly in percentage less than 1 to 150,000. He says that it is impossible to state whether this is of hexamethylenamin itself or formaldehyde, and that, in this dilution, neither of these drugs possesses any antiseptic value, and that, therefore, either for the caring or bettering of, or as a prophylactic against, infections of the bile passages, respiratory passages and the cerebrospinal system, the use of hexamethylenamin is illusory, and cannot possibly yield results. He, however, found that, with limitations, it is superior in cases of urinary infection to any other drug in common use.

The clinical value, however, of hexamethylenamin has again been shown by Arthur A. Eisenberg³ in the treatment of acute rhinitis. He mentions the fact that the drug must be given early in the disease before secretion has started, preferably in a few large doses. In a number of school children thus treated the results were most gratifying, and it seemed to have prevented all the complications of acute rhinitis, such as bronchitis and accessory sinus disease. The use of hexamethylenamin in bronchitis seems to have given more and better results under Eisenberg's administration than it has to the majority of physicians.

Vanderhoof,⁴ however, supports Eisenberg's claim, and says that it is our best remedy in acute bronchitis, and also that certain cases of chronic bronchitis respond very rapidly to its administration, though he admits that others show no results. To obtain the best results from hexamethylenamin it must be given in large doses with copious quantities of water, and must be administered in the very early stage of the acute attacks.

¹ Wiener klinischer Wochenschrift, January 25, 1912, Band xxv.

² Archives of Internal Medicine, October, 1912, vol. x.

³ Journal of the American Medical Association, 1912, p. 2032.

⁴ Ibid., February 3, 1912, p. 331.

J. S. Crowe¹ believes that hexamethylenamin is an extremely valuable drug in the treatment of intercranial infections, also in suppurative diseases of the ear, including labyrinthitis. As a prophylactic, it is useful in the early stages of poliomyelitis. He uses the drug in enormous doses, giving on the average 75 grains a day. Out of 95 cases receiving this dose, 7 showed painful micturition and hematuria. In one case, 75 grains were given at a single dose, and followed by as much as 100 grains a day. He says that the irritation of the urinary tract following its use is generally due to giving the drug without proper dilution. The hematuria and bladder irritation clears up promptly on withdrawal of the drug and the administration of copious quantities of water, and does not leave any chronic condition as a consequence of its use.

We have seen some very brilliant results following the use of this drug in acute rhinitis, but have never been able to satisfy ourselves that it is of any great value in cases of chronic disease.

Stephen Lutz² suggests the use of *alcohol in the treatment of accessory sinus disease*, especially of the maxillary antrum. He employs it in strengths of from 50 to 95 per cent. as the patient becomes tolerant to the injections. The cavity should be washed out with warm boric acid solution and the excess of solution blown out with air before the alcohol is injected. Out of 85 cases of accessory sinus trouble treated by Lutz with this method, all of them were cured within five weeks.

In the use of the ordinary drugs employed in our every-day practice in laryngology and rhinology, it is sometimes well to bear in mind that poisonous effects can be produced and that certain patients have idiosyncrasies toward certain drugs even in ordinarily non-toxic doses. Harris³ reports an interesting case of cocaine poisoning. The patient was to have had an operation for deflected septum. Several pieces saturated with 4 per cent. solution of cocaine with the excess squeezed out were placed in the nose. In thirty minutes she was found semi-conscious and soon went into complete delirium. Her color was good, also the pulse was regular, running about 100. The respiration was 14, the pupils slightly dilated, and responded only slightly to light. The reflexes were exaggerated and there was a Kernig sign present, but there was no motor or sensory paralysis. She was at no time wildly delirious and was kept quiet by morphine. The unconsciousness lasted twenty-four hours, and at the end of that time she was practically normal, and had no recollection of what had transpired.

Menthol is used so frequently in diseases of the nose that its application has come to be regarded as almost without danger. Nevertheless, Leroux⁴ does not hesitate to accuse menthol of being always

¹ Bulletin of the Johns Hopkins Hospital, 1912, vol. xxiii, p. 255.

² Laryngoscope, August, 1912, vol. xxii, p. 1045.

³ Post-Graduate, 1912, vol. xxvii, p. 391.

⁴ Presse médicale, February 7, 1912, vol. xx, No. 11, pp. 113 to 120.

treacherous, frequently dangerous, and sometimes fatal in its effects. He adds to the list of cases of menthol poisoning several unpublished cases, including the alarming reflex suffocation presented by his own infant after the instillation of one drop of 1 per cent. mentholated oil for acute coryza. He also calls attention to serious reflex accidents liable in young infants from its use, coming on with the suddenness and danger of a chloroform accident.

Lubinski¹ placed a small amount of 2 per cent. *Coryfin vaseline*, a preparation of menthol, in the nose of an otherwise healthy baby nearly a year old and rubbed it around lightly with his finger. The child was seized at once with spasm of the glottis, cyanosis, and the pulse became imperceptible. Under artificial respiration and wrapping the throat in hot sponges, the child was relieved but still was unable to breathe freely on account of excessive secretion in the nasopharynx. After this secretion was removed, respiration became regular once more about fifteen minutes after the first symptom. Other cases of accidents with menthol have been mentioned or have been published, some of them terminating fatally, but it does seem that these accidents must be exceedingly rare considering the enormous quantity of menthol that is used, and in sometimes quite large doses. It must, however, be recognized that an idiosyncrasy toward this drug as well as cocaine does exist, and this fact should be constantly borne in mind by practitioners.

THE NOSE

External Deformities of the Nose are so difficult to correct that any improvements in technique are unusually welcome.

W. W. Carter² describes in detail his APPARATUS FOR HOLDING IN PLACE THE BRIDGE OF THE NOSE AFTER IT HAS BEEN MOBILIZED BY OPERATIVE PROCEDURES. It consists in a mechanical bridge, the ends of which rest against the front of the face just beyond each side of the nose. Two oblong, narrow intranasal splints are attached to this bridge by sutures which pass from within the nose through the cartilaginous dorsum just below its attachment to the nasal bones. The wings of the bridge, which rest against the face, are adjustable by means of a thumb screw, and can be brought together so as to give proper support to the base of the nasal triangle. The instrument is left in position for two weeks. When the nasal deformity is attended by loss of bone, the author resorts to an autoplasmic operation. He removes a portion of the ninth rib, shapes it to suit the contour of the nose, and transplants this section of bone to act as the nasal support. The middle portion of the rib is selected because the slight curve is of distinct advantage. How-

¹ Berliner klinische Wochenschrift, February 5, 1912, vol. xlix.

² Medical Record, December, 1911.

ever, those desiring to use this method of operating should read the original article, as the method of bone transplantation is given in detail and is well illustrated. The bridge splint seems to possess distinct advantage over any previous nasal splints, as it overcomes the tendency of the sinking inward of the loosened nasal bones.

Another ingenious method for supporting the bridge of the nose in cases of depression is that described by Otto Glogau.¹ This procedure consists in doing a submucous resection of the septum and utilizing a portion of the cartilage removed as the support. After removal of the cartilage, a transverse incision is made across the dorsum of the nose 1 cm. long just below the nasal bones. Through this incision the subcutaneous tissue is loosened downward to the point of the nose and the cartilage freshened with a curette. In removing the cartilage from the septum, it is necessary to retain the perichondrium on one side of it, and the portion removed should correspond to the amount required for the correction of the deformity. The cartilage is then placed in the pocket made by the dissection of the skin of the nose and the wound closed with catgut. As the author says this operation is especially adaptable to traumatic depressions of the nose due to fracture of the septum, the depressions in these cases being just below the nasal bone.

One of the most troublesome congenital deformities of the nose is NARROWING OF THE NOSTRILS DUE TO COLLAPSE OR THICKENING OF THE ALAR CARTILAGES. Leshure² has devised a rather ingenious method of treating these cases where there is redundancy of the alæ. He reduces the size of the alar cartilages by an elliptical incision on the inside of the nose, so placed that its axis coincides with that of the redundancy. This incision includes the skin, and also a wedge-shaped piece of the cartilage. The greatest difficulty of the operation is found in the introduction of the sutures.

A very interesting piece of work confirming previous anatomical studies as to THE RELATION BETWEEN THE LYMPHATICS OF THE UPPER PART OF THE NOSE AND THE CRANIAL CAVITY has been done by Zwillinger.³ Zwillinger, in these studies, used the method of Gerota, which consists in injecting into the tissues, which are to be studied, a mixture of Prussian blue, turpentine, and ether. He made these injections both into the mucosa of the upper part of the nasal cavity and also into the dura over the cribriform plate. After the injection, the preparation was hardened in formalin for twenty-four hours. From his results he proves, (1) that in the human being, under normal conditions, there is a direct connection between the lymph vessels in the upper part of the nasal cavity and the lymph spaces of the central nervous system; (2) that these superficial lymph vessels in the upper part of the nasal cavity

¹ *Zeitschrift f. Laryngologie, etc.*, 1912, vol. v, p. 613.

² *Laryngoscope*, 1912, vol. xxii, p. 1007.

³ *Archiv f. Laryngologie und Rhinologie*, 1912, vol. xxvi, p. 66.

which connect with the perimeningeal lymph spaces are independent of the perineural lymphatics of the olfactory nerve; (3) that post-operative or other kinds of meningeal and cerebral infections may originate from the nasal cavity through the lymphatics in the upper part of the nose.

In view of the fact that the existence of direct lymphatic connection between the upper part of the nose and the cranial cavity has been so well established, it seems remarkable that meningitis, and other forms of cerebral complications, are so comparatively rare following operations on the nasal cavity. The direction of the lymph current probably plays an important part in the prevention of cranial complications, and it would seem that the determination of the direction of this current would make a very profitable research. It is also probably due to the active bactericidal qualities of the nasal secretion that more frequent cranial complications do not occur.

Concerning THE POSSIBILITY OF INFECTION PASSING THROUGH THE LYMPHATICS IN THE UPPER PART OF THE NOSE, there is a very interesting article by Simon Flexner¹ on THE MODE OF INFECTION IN EPIDEMIC POLIOMYELITIS. This is a very clear and concise statement concerning our present-day knowledge as to the method of entrance, and also of exit of the virus of poliomyelitis. Flexner says that the virus having found its way through the meninges does not long remain in the cerebrospinal fluid, but escapes in part into the blood where it seems incapable of surviving for any length of time. A part of the virus also escapes through the lymphatics in the upper part of the nose, and once having gained the mucous membrane of the nose the virus may in part escape into the mucous secretions with which it is carried into the mouth and swallowed, or it may become established in the mucous membrane where it undergoes subsequent multiplication and increase. He further says, that in the human being, while the virus is incapable of passing through the skin or being taken up from the stomach or intestines under normal conditions, it passes with readiness through the practically intact mucous membrane of the nose to the central nervous system. Hence, the fact has been established that, in man, the nasal mucous membrane is the site both of ingress and egress of the poliomyelitis virus.

For an operation that gives so much satisfaction as the

Submucous Resection of the Nasal Septum, there has been a great deal of controversy during the last year concerning the best method of doing it. The tendency is toward more care and less precipitation. There is a great deal of diversity of opinion concerning the advisability of making the so-called L-shaped incision, as championed by Otto Freer,² and the single perpendicular incision placed on the extreme anterior portion of the septum.

¹ Journal of the American Medical Association, 1912, vol. lix, p. 1371.

² Ibid., p. 1127.

Garraghan¹ sides with Freer in preferring the L-incision. He says that infection is far less apt to occur because of the better drainage, and he has never seen hematoma or septal abscess following the open method. Garraghan also decries haste in the submucous resection as he says, in this operation, thoroughness and care are of the utmost importance.

On the other side, Richardson² resorts uniformly to the vertical incision carrying it through both the mucoperichondrium and the cartilage, extending from as high under the dorsum of the nose as it is possible to reach, down to and extending into the floor of the nose. He determines when the knife has been carried through the cartilage of the perichondrium on the concave side by the finger which is inserted into the nostril on the concave side. Should blood appear on the concave side at the time of the incision he makes another incision through the cartilage three 3 mm. posterior to the original one. This is done in order to prevent perforation.

The fact of the matter is that the single incision is suited to cases of simple deflection, but where there are large ridges and the operation difficult, the better view of the septum furnished by the L-incision makes this method preferable, even though the wound heals more slowly and the patient is bothered by crusting for a greater length of time than when the small anterior incision is used. In spite of Freer's contentions to the contrary, the swivel knife of Ballinger is the best instrument for removing the greater part of the cartilage.

F. Conger Smith³ suggests the use of the actual cautery of making the initial incision through the mucoperichondrium. The advantages, which he claims for this procedure, are, the greater degree of asepsis, the absence of bleeding during this step of the operation, the ease with which the cautery is brought down to the cartilage without going through it and the seared edges of the mucous membrane as well as the perichondrium recedes slightly so that their elevation is easily and quickly accomplished. He says that primary union, as we see it in the nose is not apparently retarded.

Richardson advises the use of general anesthesia with chloroform for the submucous resection, saying there is less shock and, of course, no pain, and the surgeon is very much more at his ease and can concentrate his whole attention on the operation. Also, the finger may be used much more freely for exploration under general anesthesia, and this Richardson considers of great value. However, we cannot recommend, as a rule, the use of general anesthesia in this operation, and almost all the operators in this country and abroad prefer local anesthesia. The operation can be done with scarcely any pain under local

¹ *Laryngoscope*, 1912, vol. xxii, No. 5, p. 759.

² *Journal of the American Medical Association*, 1912, vol. lix, p. 1131.

³ *Ibid.*, p. 197.

anesthesia, and the advantages of having coöperation on the part of the patient, and a practically bloodless field are sufficiently great to outweigh all the objections to local anesthesia.

There is considerable difference of opinion as to the advisability of doing the *submucous resection on children*.

Loeb¹ believes that the operation should not be done under seven-teen or eighteen years of age unless it is to afford drainage to relieve associated conditions, such as sinus or middle-ear disease. He quotes from Rethi who says that the development of the septum has a marked influence on the face in adult life, and also from Lothrop, who has observed depressions of the tip of the nose after operation in five instances between the age of seven and thirteen years. The depression was not due so much to the insufficient support of too little cartilage, but to a lessened growth of the remaining cartilage while the bones of the face developed normally.

Concerning the results of the submucous resection, J. Burton Hamilton² describes the condition found after some years had elapsed in fifty submucous resections. In 80 per cent. there was an excellent functional result. In two of the remaining cases, there was crusting and bleeding, though the breathing was much improved. There were perforations in 22 per cent. Five of the 12 cases of perforation had no inconvenience whatever, 5 were bothered by slight crusting; 1 had a good deal of crusting and bleeding, and 1 complained of a whistling sound at times.

Daniel MacKenzie³ had 16 perforations in 130 cases, but most of these were small and occurred in his early cases. He says that the perforations were not always produced by the operation, but sometimes resulted from sepsis or from the devitalizing of the flaps by bruising.

J. Burt Hamilton says that, as a rule, the submucous resection in cases of asthma has not been as satisfactory as was hoped for, but in the cases reported by him all showed some improvement.

Nasal Diphtheria. In an article by Duncan Forbes and H. P. News-home,⁴ it is proposed to treat *nasal diphtheria*, or as it is termed by the authors, *Membranous Rhinitis*, with autogenous vaccines. They are, of course, prepared from the individual organism and are given at intervals from five to seven days in doses beginning at 5,000,000 and running up to 400,000,000. The authors say that an autogenous vaccine seems to be of definite value in removing membrane and getting rid of nasal discharge, and hence greatly reducing the infectivity of membranous rhinitis, but the vaccine does not appear to be capable of completing the work of elimination of the bacilli after the membrane has gone. The inadvisability of such method of treating diphtheria

¹ Journal of the American Medical Association, 1912, vol. lvi, p. 1133.

² Journal of Laryngology, 1912, vol. xxvii, p. 250.

³ Ibid., p. 84.

⁴ Lancet, February 3, 1912, p. 292.

is very apparent. The treatment ought to begin at the moment of diagnosis, and to wait until a vaccine has been prepared will frequently be to wait until the patient is dead. It is possible that the vaccine may be used in conjunction with antitoxin and help to get rid of some of the bacteria, but here again this method of treatment does not seem to be of much value, for the authors say themselves that the autogenous vaccine does not entirely rid the patient of the infecting organism.

Rhinitis Hyperplastica Edematosa is a rare disease of the nasal mucosa. Schonfeld,¹ reports 29 cases which he has seen and treated. The importance of the habit of using tobacco snuff as an etiological factor is shown by the fact that all of these cases, with the exception of one, had this habit. Clinically, the disease can be recognized by a peculiar pale, almost gelatinous-appearing condition of the mucosa. The diseased tissue is of rather firm consistency, with smooth or slightly irregular surface, and there is an excretion of an absolutely clear, transparent fluid without any admixture of pus. Cocaine and adrenalin have little or no effect in reducing the volume of the swelling. Histologic examination of some of the tissue removed showed a peculiar edematous infiltration of the subepithelial connective tissue with a nearly normal epithelium and very little actual increase in the connective tissues. Schonfeld says that the treatment for this condition consists in the resection of a portion of the turbinal throughout its whole length. This is best done with a long knife passed through the nasal fossæ to the posterior end of the turbinal and made to cut from behind forward so that a triangular piece is removed out of the hypertrophied turbinal. Then, by proper packing, the cut edges are brought together and made to heal in this position. In these cases in which there is a habit of using tobacco snuff, a cure of the condition can probably be brought about by abstinence from the snuff, but Schonfeld found that the patients were generally more willing to have the operation done than to stop the use of the snuff.

Concerning the reduction of hypertrophy of the inferior turbinal, Freer² again advises the submucous resection of the turbinate bone. He anesthetizes by rubbing a swab, saturated with a 1 to 1000 solution of adrenalin and dipped into flaked crystals of cocaine, along the turbinate surface. In operating, he makes a small, vertical cut at the anterior end of the turbinate, then with sharp elevators the mucoperiosteum is elevated from the convex side of the turbinate bone clear to its posterior end. The flap is cut free from the bone along the free edge of the turbinate, the surgeon being sure that all adherent portions are carefully severed. The turbinate bone is loosened from its attachment, by a chisel placed against the anterior end of the bone and driven backward. The mucous membrane of the inferior surface of the tur-

¹ Zeitschrift f. Laryngologie, Rhinologie, etc., 1912, vol. v, p. 299.

² Laryngoscope, December 11, 1911, vol. xxi, p. 36.

binate is of necessity sacrificed. He finds that the most difficult part of the operation is to sever the posterior end of the turbinate, and that this can be best accomplished with a long sharp elevator. The loose upper flap is then replaced and held in position by his layer method of tamponing. He calls special attention to the advantages to be gained by this method of operating over other forms of turbinal reduction, but also says that it should never be employed when a deflection of the nasal septum is the fundamental cause of the obstruction.

The method of reducing hypertrophied turbinals by removing the bone does not attack the hypertrophied portion of the turbinal, because the hypertrophy itself involves only the mucous membrane and very seldom the bone. Freer unconsciously acknowledges this fact when he removes all of the mucous membrane on the inferior concave side of the bone. Also, it seems that the operation is rather a formidable one, when much less severe methods can be adopted for accomplishing the same purpose.

Acute Rhinitis. An instructive study, both as to the *etiology* and *treatment* of acute rhinitis, is that of G. H. Sherman¹. Sherman's bacteriological researches have shown that, in the large majority of acute colds, the pneumococcus, or some form of the streptococcus, is the infecting organism. In subacute or chronic cases, the *Micrococcus catarrhalis*, or some of the staphylococci, will be found. As a result of this bacteriological study, he has for the last three years been treating acute colds routinely with *stock vaccines*. Formerly the diagnosis was always verified by a bacteriological examination, but the frequency with which pneumococci and streptococci, or both, were found has led him to do away, in a majority of cases, with a confirming bacteriological examination, and he now gives immediately a mixed stock vaccine of pneumococci and streptococci. When there is a frequent recurrence, or when the cold does not seem to be absolutely well between the acute attacks, he is accustomed to add the *Micrococcus catarrhalis* to the vaccine. Sherman claims, for this method of treatment, that within twelve to twenty-four hours after the first injection marked improvement is obtained, frequently to the extent that all acute symptoms have subsided and the patient goes on to complete recovery. However, in almost all cases another dose should be given on the second day, and after that every three to six days until absolutely all symptoms have cleared up. This is done in order to prevent relapse. The vaccine treatment, Sherman says, absolutely prevents all complications, such as sinusitis, otitis media, and bronchitis. Sometimes vaccine treatment also gives very excellent results in chronic catarrhal conditions, but not so uniformly as in the acute infections. If the vaccine treatment, as advised by Sherman accomplishes all that he says it will, it will be a very useful addition to our equipment for treating the severe cases

¹ New York Medical Journal, March 2, 1912, vol. xcv, p. 433.

of nasal infection. It does seem, however, as a rather heroic measure to adopt for the ordinary cold, and it is probable that we would find few persons willing to submit to the numerous injections.

Atrophic Rhinitis still seems to remain surrounded with a good deal of mystery as to its etiology and also as to its exact pathology, and this in spite of a considerable amount of research work that has been done both in this country and abroad. Alfred Rundstom¹ has made a careful study of a large number of cases, and his research work has been carried out along both clinical and pathological lines. The majority of his cases belonged to the so-called Fränkel's form of ozena, which are benefited, if not cured, by opening up of the accessory sinus. In judging of the relation of the accessory sinuses to atrophic rhinitis, Rundstom calls attention to the fact that without operative interference in these cases it is exceedingly difficult to make a diagnosis of accessory sinus disease. This is due to the fact that the secretion within the sinuses is of such a nature that it readily dries into crusts, and hence does not flow out into the nose where it can be observed. He recognizes two distinct types of atrophic rhinitis, one the *fetid variety*, and the other the *non-fetid variety*, and says that the two types have also distinct pathological differences. In the fetid variety, the ulcerative process of the accessory sinuses attacks not only the mucous membrane, but also involves the bone. On the other hand, in the non-fetid variety the mucous membrane is generally alone involved, and, if a small portion of the mucous membrane should be destroyed, the bony tissues remain white and unchanged. However, the most important part of this exhaustive work deals with the etiology of ozena, the fetid type of atrophic rhinitis, and his result leads him to the belief that this disease is nothing else, in the beginning, than an ulcerating ethmoiditis, which secondarily leads to atrophic changes in the nasal mucous membrane. In support of this view he says that ozena is originally a chronic suppurative inflammatory process of the mucous membrane lining the ethmoidal cells. Through closure of the cell openings, a retention of the secretion in the cells is necessarily brought about. As this condition is most frequently seen in childhood when the tissues are soft and pliable, the retention leads to an ectasia or enlargement of the ethmoidal labyrinth, which, in turn, causes a broadening of the nasal fossæ, and a change in the external form of the nose. Because of the pressure, and also of the inflammatory process within the accessory sinuses, the mucous membrane of these cells becomes destroyed, so that the bony tissue is easily attacked and then becomes involved. The increase in the width of the nasal passages and the large percentage of solid material in the secretion makes for rapid drying of the secretion from the ethmoidal cells. The crust thus formed lodges at first in the nasal fossæ, and, later, in the ethmoidal cells. These

¹ Archiv f. Rhinologie und Laryngologie, etc., 1912, vol. xxvi, p. 89.

crusts produce sufficient irritation on the mucous membrane of the nasal cavities to induce, and keep up, an inflammatory condition. As this inflammation of the mucous membrane progresses, the underlying bone is finally reached and undergoes a rarefying osteitis.

It would seem that Rundstrom's claim that fetid atrophic rhinitis is essentially a purulent ulcerative ethmoiditis is a just conclusion if we accept the accuracy of his observation. It is probable that certain cases of atrophic rhinitis follow upon a purulent ethmoiditis of childhood, but it is a difficult matter to determine the exact extent of ulceration within the ethmoidal cells in these cases, or even the exact amount of inflammatory process of the mucous membrane. One, therefore, is scarcely justified in accepting, without further evidence, the hypothesis that all cases of ozena originate from an ulcerative process within the ethmoidal cells. Certainly Rundstrom's theory could not apply to cases of atrophic pharyngitis or trachitis. More likely the mucous membrane of the ethmoidal cells are involved, along with the mucous membrane of the nasal fossæ or nasopharynx. However, even if such is the case, there is no reason why the inflammatory process within the ethmoidal cells does not cause the ectasia and dilatation of the ethmoidal labyrinth, as suggested by Rundstrom.

Accessory Sinus Disease. Onozi¹ calls attention to the diagnostic value of a *central scotoma* in cases of involvement of the posterior sinuses. The condition, as previously described by Birch Hirschfeld, is apparently due to damage of the vulnerable papillomacular bundle. The scotoma, as shown by Howe, is generally preceded by an enlargement of the blind spot for color. Onozi, however, questions the absolute reliability of this eye symptom, as he has seen a relative scotoma in cases of empyema of the antrum of Highmore, of the frontal sinus, as well as in empyemas of the ethmoidal cells and sphenoidal sinus. Further, the enlargement of the blind spot, with the central scotoma, can arise from other causes having nothing whatever to do with accessory sinus disease, and disease of the posterior sinuses frequently exists without any changes at all in the fundus.

Of equal unreliability is the unilateral neuritis which Mendel and Latersonne have described as being characteristic of nasal disease.

This article of Onozi's is very timely, for while the eye conditions described are frequently due to sinus disease, the enthusiastic claims advanced by those who first discovered that enlargement of the blind spot may be due to disease of the posterior sinuses have led occasionally to unnecessary and severe intranasal operations. We must not, however, overlook the importance of sinus disease as etiological factors in eye disturbances, nor neglect to operate when interference is indicated. Also at times exploratory operations are justified even when involvement of the accessory sinuses does not apparently exist.

¹ Journal of Laryngology, 1912, p. 9.

Stenger¹ reports a number of cases in which there was association of eye and nasal lesions. In one case of scotoma in which the nose seemed normal except for swelling of the mucosa and enlargement of the pharyngeal tonsil, the removal of the middle turbinate and clearing out of the ethmoidal sinuses brought about prompt relief.

J. H. Bryan,² in an elaborate article, gives a fairly reasonable view of the relation which diseases of the eye or changes of the fundus hold to disease of the accessory sinuses, though he inclines to the side of the enthusiast. He says that in general it may be stated that diseases of the anterior group of sinuses cause affection of the bulb, while those of the posterior group cause retrobulbar disturbances, but that only when the process is more severe does the papillomacular bundle become involved producing scotoma. He believes that scotoma and enlargement of the blind spot are so frequently found in posterior sinus inflammation as to make them almost pathognomonic.

Concerning the *size of the sphenoidal sinus*, Loeb³ has made some interesting measurements. He made these measurements by taking plaster of Paris impressions of adjacent portions of the sphenoidal sinuses and then uniting these portions at their proper place, making a complete mold of the sinus. The casts made in this manner, which were twenty in number, give a very clear idea of the form, size, variety, irregular contour of the sinuses, and also the exact relation of two sinuses to each other. From the casts thus prepared, he found that the cubal capacity of the twenty sphenoidal sinuses examined varied from 0.6 c.c. to 11.8 c.c., with an average of 5.145 c.c. and that the superficial area, which was obtained by covering the surface of the cast with small pieces of adhesive plaster, varied from 2.4 to 28.2 sq. cm. with an average of 16.65 sq. cm. His article contains numerous illustrations, and to those especially interested in the subject it is well worth reading in the original.

Another instructive anatomical study of the sphenoidal sinus is that by L. Onodi.⁴ Onodi made a series of dissections and studied the *relation of the nerves entering the sphenoidal fissure to the sphenoidal sinus*. He found the thin transparent bony wall of the sphenoidal sinus was in direct contact with the trunk of the oculomotor nerve in 1 case, with the trunk of the trochlear nerve in 1 case, and with the first branch of the trigeminal nerve in 6 cases, and with the second branch of the trigeminal nerve in 6 cases, and with the abducent nerve in 6 cases. In 1 case the sphenoidal sinus was in relation with the trochlear, the oculomotor, the first branch of the trigeminal and the abducent nerve. In all of the other cases which he examined, the

¹ *Therapy der Gegenwart*, June, 1912, vol. li, No. 6.

² *Surgery, Gynecology, and Obstetrics*, 1912, vol. xiv, p. 565.

³ *Annals of Otology, Rhinology, and Laryngology*, 1912, vol. xxi, p. 1.

⁴ *Archiv f. Laryngologie, etc.*, 1912, vol. xxvi, p. 357.

sphenoidal sinus had no relation to the trochlear, oculomotor, trigeminal, or the abducent nerves. From this study it would seem that some cases of obscure nerve involvement can be explained by the possible relation of one of these nerves to the sphenoidal sinus, and, therefore, it is important in these cases to examine the sphenoidal sinus for pathological conditions.

To show the *relative frequency of involvement of the accessory sinuses in chronic infectious disease*, Ross H. Skillern¹ has carried out a series of investigations in tuberculous patients. According to the statistics collected by Skillern, postmortem examinations by a number of authors have shown that in cases of tuberculosis, 37 per cent. had disease of the maxillary antra. Believing that this was a rather high percentage, he examined during life the antra of 100 patients who were in the last stages of consumption. The antra were punctured under proper precaution and washed out through the puncturing needle, and the returning fluid carefully examined. He found that only 11 per cent. of the cases showed any disease of the sinuses, and believes that the discrepancy between his findings and those already published, which latter were made after death, was due to postmortem changes. Further, in a series of experiments made by puncturing the antra under aseptic precautions, and then injecting a small quantity of fluid, which was immediately aspirated and collected into a sterile vessel, he found that the antra was always sterile. From his study he concludes that the sinuses in health are free from bacteria; that tuberculous patients are not more prone to sinus inflammation than are other individuals; that tuberculosis of the lungs does not predispose to sinus inflammation, and also that actual tuberculous processes are rarely, if ever, found isolated in the sinuses. Although this article is open to the criticism that pus cannot always be obtained by irrigation of diseased sinuses, the error would be of such a small per cent. that it seems Skillern is justified in his general conclusions. Skillern's bacteriological examinations of the antra confirm the results of other recent investigations which have shown that in health, at least, the sinuses, as well as the greater part of the nasal cavity, are always sterile. The comparative rareness of even secondary lesions of tuberculosis in the nose would seem to indicate that this organ is not especially prone to tuberculous infection, and there is no reason to believe that tuberculosis predisposes to other associated infections of the nose more than does any other equally devitalizing disease.

It is gratifying to see the tendency growing during the last year for rhinologists to try the more conservative methods of *treating frontal sinus disease* before adopting such radical measures as the Killian operation.

¹ Journal of the American Medical Association, 1912, vol. lix, p. 1136.

Frontal Sinus.—The difficulty of opening up the frontal sinus by the endonasal route has led to the adoption by different authors of various forms of instruments, each one being especially adapted to the peculiar skill of the individual which uses it. Segura¹ uses a cutting instrument with ten superimposed cutting disks, inclining backward at regular intervals for an inch from the tip. They are so made that they cannot cut when the instrument is drawn backward. This instrument is used for gaining access to the frontal sinus through the nose, and is to be followed by a curet to get rid of a greater part of the disease. He has operated on 40 cases, and says the cure is almost always prompt and complete. His chief attack is, of course, delivered at the base of the sinus.

Another curet for operating through the nose upon the frontal sinus is that devised by Higbee.² His instrument consists of a properly curved stem on the end of which is a round disk-like curet resembling somewhat the head of a tack. These curets are made in three sizes, and are used after the removal of the anterior end of the middle turbinal. In using them the curet must always move forward and laterally, as well as downward, to avoid serious injury to the cranial cavity.

Concerning the *external operation for empyema of the frontal sinus*, the method proposed by C. Ritter³ possesses a certain development of technique which makes it worth while considering somewhat in detail. Ritter says that this operation, though while it does not always produce such universally good results as the Killian method, the very good cosmetic results which follow it make it advisable practically in all cases. This is especially true because when the operation happens not to be successful it is only required to perform a slight second operation under local anesthesia to make it practically a Killian.

Ritter's method of operating is as follows: After clipping the eyebrow, an incision is made, cutting through the soft tissues down to the bone, beginning on the supra-orbital ridge just inside of a point immediately above the inner angle of the eye. It is carried in a curve downward alongside of the nose, close to the bridge, reaching to the upper edge of the pyriform aperture. After elevating the periosteum, an exploratory opening is made through the floor of the frontal sinus just above the place where the frontal bone, the lacrymal bone, and the frontal process of the maxilla come together. It is, however, important to remember that at this point there is frequently a large fronto-ethmoidal cell. If a previous x-ray picture has not been taken, it is necessary to determine at the operation whether this is really an ethmoidal cell or the frontal sinus. A dull probe pressed firmly against the roof

¹ *Semana Medica Buenos Aires*, May 23, 1912, vol. xix, No. 21.

² *Journal of the American Medical Association*, 1912, vol. lvi, p. 1653.

³ *Zeitschrift f. Laryngologie, Rhinologie, und ihre Grenzgebiete*, 1912, vol. v, p. 17.

of the cavity breaks easily into the frontal sinus should the cavity first entered be an ethmoidal cell, but the resistance of the posterior wall of the frontal sinus makes it scarcely possible for any reasonable pressure to force the probe into the cranial cavity. Having determined upon the size and condition of the frontal sinus, the anterior ethmoidal cells are first attacked, and opened up by removing the lacrymal bone and the frontal process of the maxilla. Ritter believes that the removal of the nasal bone, as advised by Luc, is not necessary. The ethmoidal cells, and even the sphenoidal sinus, can now be easily opened up to the extent of their involvement. In opening up the ethmoidal cells, care should be exercised not to wound the cribriform plate or to tear out bundles of the olfactory nerve. Either of these accidents may lead to intracranial infection. The median wall of the ethmoid bone should be left intact until all the ethmoidal cells have been thoroughly removed. In using the forceps, the blade should be held crosswise; in using the curet, the instruments should be worked from above downward and outward. It is well at this time to pack the ethmoidal labyrinth and proceed to the further opening of the frontal sinus. After the inner wall of the ethmoid has been gently pushed outward, it can be removed by a good cutting conchotome, leaving a stump about 3 mm. high. When the frontal sinus is small, the original incision offers sufficient room for the removal of the floor; but if it is very large, the skin incision must be prolonged outward just beneath the ridge of the supra-orbital margin, cutting through the supra-orbital nerve and vessels. In large sinuses it is necessary to detach the trochlea from the roof of the orbit, which, however, should be done subperiosteally. After removing the floor of the frontal sinus, there is frequently left a sharp ridge of bone running downward and inward from the supra-orbital margin. To gain a good insight into the upper part of the sinus this ridge must be removed by chiselling upward, the handle of the chisel being held close to the face. If now all portions of the frontal sinus, especially the extreme upper limit, cannot be reached by the curet, another incision is made through the skin of the forehead at a point corresponding to the upper limit of the frontal sinus as determined by measurements with the probe. The frontal sinus is again entered through this incision and all mucous membrane thoroughly removed; the upper opening into the sinus is extended outward until this can be readily accomplished. Before closing the wound, if the trochlea has been separated from its bed it is brought forward and fastened by a suture to the periosteum of the supra-orbital margin. If this is done, chances of double vision are very small. The nasal cavities should be packed with iodoform gauze for twenty-four hours, and then the nose douched for a few days if there is much discharge.

Ritter says that after this operation the frontal sinuses do not fill up solidly with fibrous tissue, and that, therefore, a frontal opening into

the nose must be retained in order that the secretions from the granulating tissue may find an exit. Should headache, edema of the lid, or other evidences of stenosis of the opening occur, the sinus opening into the nose should be examined and freed by curetting any granulation tissue until the lumen of the opening is sufficiently large so that the sinus cavity can be easily entered. Chromic acid may be used for cauterization, and also large metal bougies regularly passed. If, after the lapse of several months, the discharge does not stop and there are other reasons for further interference, the frontal wall of the sinus can be resected under local anesthesia so that the final result is similar to that following a Killian operation. Ritter has operated on 30 cases by this technique, with 28 cures. This operation especially commends itself because of the absence of deformity which frequently follows a Killian operation. The after-treatment, however, must be more faithfully watched and looked out for, and for that reason probably causes more discomfort to the patient than does the Killian.

Concerning the *method of operating for the relief of chronic empyema of the maxillary sinus* little has been added to our knowledge of the subject. There is, however, a distinct tendency to avoid doing an external operation, such as the Caldwell-Luc, and to confine the attack to the internal wall beneath the inferior turbinal. The endeavor seems to be to create a large opening between the maxillary sinus and the nasal cavities without sacrificing much of the turbinate, and various instruments have been brought forward to accomplish this. A new sinus punch devised by W. P. Roades¹ seems very useful. This instrument is simply an adaptation of the Fletcher tack-head punch or the Freeman sphenoidal sinus punch, the shaft being bent at almost a right angle so as to enter readily into a trocar wound through the internal wall of the sinus. The cup pressing against the tack head cuts in all directions so that the opening can be enlarged upward, downward, forward, or backward.

An ingenious *instrument for the diagnosis of disease of the maxillary antrum* is a so-called *antroscope* invented by Dr. E. von Golyzi.² This instrument is built somewhat on the plan of a nasal pharyngoscope, except that there is a cannula fitting closely over the pharyngoscope, terminating in a pointed trocar. The instrument is so made that when it is introduced the cannula covers the window of the scope, but after its introduction the scope is turned around so that the lens faces the window and the whole side of the antrum can be seen and the condition of the mucous membrane, polyps, etc., determined. The instrument is made for introduction through the inferior meatus.

Though in maxillary sinus disease the majority of authors still think it advisable to open through the inferior meatus, Dr. Ino Kubo³ goes

¹ Journal of the American Medical Association, 1912, vol. lviii, p. 1987.

² Archiv f. Laryngologie und Rhinologie, 1911, vol. xxv, p. 144.

³ Ibid., etc., 1912, vol. xxvi, p. 351.

back to the Siebenmann supratubinal method. He says that the middle meatus is a much more natural way of opening up the maxillary sinus as here are already generally two openings, the ostium maxillare and an accessory opening, and there is little bone in their neighborhood. Also, openings made through the inferior meatus tend to close up, while those made in the middle meatus show a distinctly less tendency to do so. Again, the opening in the middle meatus is more easily made, and patients can learn to wash the sinus out through the new opening. He believes in the conservative method of treating maxillary sinus disease, washing out, if possible, through an accessory opening. If this is not present, or is too small, he creates a large opening with the little finger introduced into the nostril. Where the connection between the processes uncinatus and the processus ethmoidalis of the inferior turbinal is exceptionally hard, cutting forceps can be introduced into the accessory opening, if such exists, and the opening enlarged upward and backward. If there is no accessory opening, the processus uncinatus should be removed and the opening thus made enlarged posteriorly.

This method of operating through the middle meatus can only be properly done in exceptional cases, as the opening is too high to permit of free drainage. It is free drainage that is necessary to cure empyema of the maxillary sinus, and, if this is afforded, the larger percentage of cases will get well without further treatment. Curetting and destroying the mucous membrane of the maxillary sinus is, in the large majority of cases, unnecessary.

Relation of the Nose to the Genitalia.—There has been and still is so much uncertainty and diversion of ideas concerning the relation of the nose to the genitalia that Ernst Seifert's¹ article will be appreciated. This article is quite an elaborate thesis on the subject, giving a full critical review of the literature and discussing the various theories which have been advanced concerning the relation of the sexual organs to the various structures of the nose, both in health and in disease. He says that it would seem, upon the study of the literature and of the reports of clinical cases, that there must be some nerve connection between the nose and the sexual organs, but the pathway of such a nerve connection has never been shown. Also, particular parts of the nose are apparently anatomically and physiologically connected with corresponding parts of the genitalia. Given certain general circulatory disturbances, it is probable that pathological conditions of the sexual organs may exert an influence upon the nose that can be objectively perceived. Seifert, however, cannot agree with Fleiss, who states that there is a direct nervous connection between the nose and the sexual organs. Seifert says that the apparent relation of the nose to the sexual organs is due either to the discomfort that follows a nasal congestion, to an individual euphoria, such as may be produced by applica-

¹ *Zeitschrift f. Laryngologie und Rhinologie*, etc., 1912, vol. v, p. 431.

tions of cocaine, to the removal of nasal irritation, or to the bettering of the general condition of the patient by establishing free nasal breathing. He made a careful examination of 56 women who were pregnant, and found that, in most cases, during the last week or days of pregnancy, a localized swelling developed on the inferior, and sometimes on the middle turbinate, but much more rarely on the tubercle of the septum, and also the so-called genital spot became reddened, sometimes swollen, and slightly edematous. The rest of the mucous membrane of the nose showed very changing conditions so that it is impossible to describe a typical condition for each patient. He has never seen the periodic swelling of the nose which has been described as appearing in pregnant women at the time when the menstrual flow would have occurred had it not been interrupted by the pregnancy. Also he has never seen an acute congestion occurring at the moment of the labor pains, although he has watched closely for its occurrence, and he has never perceived any special sensitiveness of the so-called genital spot. If there was any distinct sensitiveness it seems to involve the whole of the mucous membrane, perhaps more particularly that of the septum, and it occurs in otherwise nervous and hysterical individuals. He carried out a series of experiments to determine, as it has been claimed can be done, the possibility of easing the pain in childbirth by an application of cocaine to the nose. In the first cases he cocainized only the anterior end of the middle, the whole of the inferior turbinal, and the tubercle of the septum; this had no influence on the pain. He then painted the whole of the inferior turbinal, as well as the middle turbinal and the whole of the septum. Even then the result was equally negative, although he used an 8 or 10 per cent. solution of cocaine, and the local anesthesia, and contraction of the nose took place as usual.

The evident care with which this article of Seifert has been written, and the large amount of common sense which he exhibits will have a good deal of weight with its readers as to their acceptance of his conclusions.

On the other hand, Koblanck and H. Roeder,¹ by animal experimentation, have seemed to demonstrate a very close relation between the nose and the sexual organs. They destroyed the so-called genital point and studied the results on the development of animals, and found that the animals grew as well as the control, except perhaps there was a slight loss of weight. When, however, the animals were killed, the genital organs were found practically rudimentary, and the animals seemed sexually indifferent. The control animals had two litters. The author suggests that there may be some intimate connection between the genital spot of the nose and the hypophysis, which, when the former is destroyed, causes retardation in the development of the genital organs.

¹ *Berliner klinische Wochenschrift*, 1912, vol. xlix, No. 40.

Before accepting unconditionally these results of Koblanck and Roeder, we should like to see the experiments repeated, as the results as they state them seem almost too remarkable to believe.

THE PHARYNX

Septic Sore Throat. In the spring of 1911 there occurred in Boston an outbreak of tonsillitis or septic sore throat which was most remarkable in its virulency and in the number of fatalities which followed the attack. The readers of this article have probably had this epidemic brought to their notice and are cognizant of all its main features, and it is simply mentioned here in connection with three other epidemics which have occurred since then, one in Chicago, one in Schenectady, and one in Baltimore.

Professor E. T. Winslow¹ made an exhaustive study of the Boston epidemic, studying about 1000 cases. He found the evidence to be conclusive that the trouble began with an infected milk supply from a certain farm which supplied Boston and its vicinities with about 1 per cent. of its milk. There was an epidemic of sore throat in the vicinity of the farm just prior to the epidemic in Boston, though none of the farm hands handling the milk were sick, yet, in a few cases, members of their family were infected; 80 to 90 per cent., of all the cases of sore throat during this epidemic in Boston proper could be traced to this milk supply. The infecting period was from May 8 to May 11, and the incubation period two to three days. In some cases there was typical suppurative tonsillitis; in others, a membranous form resembling diphtheria, and in others, simply an acute redness of the pharynx without any deposit. In all the cases there was secondary enlargement of the glands of the neck, and with frequent invasion of the deeper tissues, leading to sepsis, rheumatism, erysipelas, nephritis, or other infectious maladies.

Another report of this epidemic is by M. W. Richards,² He practically substantiates the findings of Winslow.

In the latter part of December, 1911, there appeared in Chicago an epidemic of sore throat somewhat similar to the Boston outbreak. The relation of this outbreak to the milk supply was studied by Joseph Capps and Joseph L. Miller.³ In their summary they state that a conservative estimate shows that over 10,000 persons were victims of this epidemic. Of a total of 622 cases investigated 87 per cent. were users of milk from dairy X, and that 79 per cent. of the 19 fatal cases were also users of this milk. Also, out of a total of 153 nurses in the hospital

¹ Boston Medical and Surgical Journal, December 14, 1911.

² Ibid., p. 907.

³ Journal of the American Medical Association, 1912, vol. lviii, p. 1848.

using X milk, 52 per cent. were attacked with sore throat, while out of a total of 721 nurses in hospitals using other milk only 4.8 per cent. were affected. It was found that an epidemic of mastitis involving 4.6 per cent. of the cows supplying milk to dairy X occurred at about the time of the outbreak of the epidemic, and also that the farmers and milkers supplying dairy X frequently had sore throat of the epidemic type contemporary with the bovine mastitis.

Davis¹ made a bacteriological study of this epidemic of sore throat and demonstrated that the infecting agent was an organism belonging to the streptococcus group. In the exudate and in the body it was usually encapsulated, but not infrequently in the throat the capsule was not present. It was highly pathogenic for animals, readily producing arthritis in rabbits and occasionally endocarditis. A similar organism was obtained from a typical case of mastitis in a cow from the farm of dairy X. This organism agreed in all essentials to the human epidemic streptococcus. Also a coccus identical in morphology, culture and pathogenicity was obtained from a human case of tonsillitis on the same farm.

D. J. Davis and C. Rosenow² report in brief the results of autopsies made in 4 cases in this epidemic. In all there was an acute serofibrinous peritonitis, from the exudate of which pure cultures of the streptococcus were obtained. This organism occupied a position midway between the ordinary hemolytic streptococcus and the streptococcus mucosa. It was encapsulated, hemolytic, and of high virulence. In 3 of the 4 cases there was acute fibrinous pleurisy, and, in 1, acute pericarditis, and in 3 the coccus was found in the heart's blood. Endocarditis was not found. The atrium of infection in 3 cases was clearly the tonsils or the throat; in the remaining case, it appeared to be a localized fibrinopurulent bronchitis following a sore throat.

Another epidemic of tonsillitis or throat infection occurred in Schenectady, and is reported by Frank Van der Bogert.³ This epidemic occurred among children only, the majority being between one and five years of age. The chief feature of these cases was glandular enlargement, although the tonsils were involved in only about one-third of the cases. Investigation of the milk supply proved that it probably had nothing to do with the epidemic.

Still another epidemic and which was apparently not connected with the milk supply occurred about the second week of January, 1912, in Baltimore. The chief features of this epidemic were that the tonsils were the chief point of attack, and that the pneumococcus was always present and was probably the causative organism. The cases were very severe, with great systemic infection and a high per cent. of morbidity.

¹ Journal of the American Medical Association, 1912, vol. lviii, p. 1852.

² Ibid., March 16, 1912, lviii, p. 773.

³ Archives of Pediatrics, 1912, vol. xxix, p. 373.

A peculiar pneumococcic infection of the pharynx is described by W. G. Porter.¹ The patient, a young boy, had a superficial ulceration involving the tonsil, the pharynx, and the tongue. It resisted all antiseptic treatment, and antisyphilitic medication likewise had no effect. A pure culture of pneumococci was obtained from the ulcerations. Vaccine treatment was tried but did not relieve the condition, and after the lapse of a month an examination showed the same condition as at the first visit. Curiously enough, about nine months after the beginning of the attack the condition suddenly cleared up during a fortnight's visit to the country, and at that time local treatment had been almost entirely given up.

Vincent's Angina. Francis Lasagna² has published an exceedingly instructive study of the *bacteriology of Vincent's angina*. Though by staining he found both the spirillum and the bacillus present, he was only able to isolate the bacillus. His method is briefly as follows: Having determined by staining that in a given case there was almost a pure infection with Vincent's bacillus, he removed some of the debris from the ulcer by means of a platinum loop. This was done after the patient had gone several days without treatment. The material removed was put into a sterile physiological salt solution and with this infected salt solution he inoculated glucose agar, as prepared at the Pasteur Institute. He did this by introducing, by means of a pipet, some of the infected salt solution down to the floor of the tubes containing the glucose agar. The tubes which at the time of the inoculation had a temperature of from 30° to 40° C. were immediately cooled on ice to expel air bubbles and were then incubated. The bacillus thus isolated when injected into animals never produced death, but merely a localized necrosis. From his studies, Lasagna says that the fusiform bacillus lives in symbiosis with other microorganisms, and that these together determine the initial lesion, but after a few days the bacillus dominates and sometimes maintains the lesion. To Vincent's bacillus must be accorded the principal part in the development of the disease, but the presence of other organisms probably increase its pathogenic power and may in fact start the original lesion.

To those who are especially interested in the subject of Vincent's angina, Edward H. Place³ publishes a very complete monograph, but to be understood and appreciated it must be seen in the original.

Diphtheria. The *local treatment of diphtheria* has received distinct aid by the recent investigation of Rendu,⁴ who found that the bacillus of diphtheria was much more susceptible to heat than were most pathogenic organisms, so that an exposure to 170° F. for one minute, of

¹ Journal of Laryngology, etc., 1912, vol. xxvii, p. 112.

² Laryngoscope, August, 1912, vol. xxii, p. 1009.

³ Boston Medical and Surgical Journal, November 9, 1912, p. 720.

⁴ Bibliothèque Universelle et Revue Suisse, May, 1912.

146° F. for ten minutes, or 122° F. for fifteen minutes were sufficient to kill it. Rendu also found, by experimenting on himself, that a temperature of 212° dry heat was borne for two minutes without inconvenience, and the temperature of 140° F. could be endured for half an hour. He obtained satisfactory results in diphtheria patients by a five-minute exposure of 176° F. While Rendu is convinced that the *hot air treatment* distinctly inhibits the growth of the bacteria, he insists that antitoxin should not be discarded and that the hot-air treatment should be used simply as a supplementary measure.

If the hot-air treatment as suggested by Rendu really inhibits or in any way destroys the diphtheria bacillus itself, it is a great advance in the therapy of this disease, because antitoxin does not destroy the bacillus so much as it neutralizes the toxin produced by them, and frequently patients will carry virulent bacilli for months without any symptoms of the disease itself, and the bacillus in these cases can infect, and does infect, other persons.

TONSILS

The lymphatic tissue of the nose and throat still seems to hold the interest not only of the specialist but also of the general practitioner, and that probably greater than any other part of the upper respiratory tract. The reason for this is apparent when we consider that probably 75 per cent. of the work which the nose and throat specialist has to do at the present day is connected with this tonsillar tissue. Also, popular attention has been directed toward the tonsillar question because of the frequency with which these lymphatic structures have to be removed. The recognition by the general profession, and also to a greater extent by the laity, of the beneficial results following the operation is in part responsible for the tendency not so much for the specialist as for the general practitioner to operate without sufficient regard as to the proper indications for the removal.

It is "this indiscriminate operating" that has led to so much criticism and confusion concerning the advisability of the tonsillar operation, and has probably incited McKenzie¹ to indulge in a tirade on the "massacre of the tonsil." While such an article perhaps is useful in restricting the tendencies of those who would operate on every tonsil that they see, it has had an exceedingly bad effect on a certain class of parents who find here an apparent good excuse to oppose any opinion that advises operation, and this even when removal of the tonsils is urgently demanded. McKenzie does, however, say that there are a multitude of conditions that call for partial destruction, or more or less complete removal, of the tonsil, and that the radical operation may

¹ Medical Journal, 1912, vol. lv, p. 138.

be done if there is definite and sufficient reason. It is true, as McKenzie says, that the tonsils develop from an anlage of the pharyngeal epithelium somewhat similar to the manner in which the thymus begins, and that the tonsils also manufacture leukocytes. The inconsistency of McKenzie, however, is shown in the fact that while he says that the tonsils are phonatory organs and play an important part in the mechanism of speech and song, he pleads for the conservation of the organs because "the functions of the tonsils are unknown." It would have been more correct for him to say that our former guesses at the functions of the tonsil have been upset by modern investigation, and that the only proved property which the tonsil possesses is the manufacture of leukocytes in its germinating follicles. He accepts, without apparent thought, certain ridiculous statements of other authors, one of which is that the tonsils have no communication with the lymphatic system; another is, that the tonsils cannot be involved in an inflammatory process without associated invasion of the neighboring structures of the pharynx. The publicity which this article of McKenzie has obtained is most unfortunate, as it is apparently not based upon scientific research or accurate clinical observation, nor upon an accurate interpretation of recent articles pertaining to the modern scientific research of the lymphatic tissue of the throat.

On the other hand, there is a convincing amount of evidence showing the possibilities of harm that may occur through tonsillar infection.

Plasma Cells of the Tonsil. J. Davis¹ has made a careful *study of the plasma cells in the tonsil*. He points out how extremely early in the life of the individual the tonsils show the results of microbic invasion. Davis says that, in the tonsils of the fetus and the newborn, plasma cells are not present. They first appear about the second or third week, and from thence on are always found in greater or less numbers in the tonsils. He further found that while the crypts of the tonsils of the fetus were, of course, always sterile, that bacteria would be present in these crypts in from twenty-two to seventy-four hours after birth. That is, they precede the appearance of the plasma cells in the substance of the tonsil proper by a short interval of time. The plasma cells are most numerous just beneath the epithelium, especially that lining the crypts. Near the trabeculae they are often seen in large numbers around the small bloodvessels. In the region of the surface epithelium there may be a few, and some are occasionally found migrating through the epithelial layers. They are quite scarce in the deeper portions of the lymphoid tissue, and the author has never seen a typical plasma cell in the centre of a lymph follicle. He believes that the presence of the plasma cells in the tonsils indicates either that the tonsils are in a state of chronic infection, or that they are absorbing toxic or irritating products, probably from the crypts.

¹ Journal of Infectious Diseases, 1912, p. 142.

General Infection Following Tonsillitis. William J. Taylor¹ reports 4 cases of severe general infection following tonsillitis. The first case was a man who had suppuration of both elbows following the tonsillar attack; the second was a child, aged five years, who had epiphysitis of the left hip following tonsillitis; the third was a woman who had an attack of tonsillitis following uvulotomy, with a streptococcic infection invading the ovaries and peritoneal cavity which finally caused death; and the fourth was a woman who suffered from tonsillitis causing a severe infection of the leg after a hypodermic injection. She recovered after weeks of illness.

Prouty² reports a case of orchitis secondary to tonsillitis which recovered promptly under the use of hexamethylenamin.

G. Finder³ claims that the tonsil may be a portal of entrance for a variety of infectious diseases, such as diphtheria, scarlet fever, acute articular rheumatism, general sepsis, cerebrospinal meningitis, acute poliomyelitis, endocarditis, orchitis, and tuberculosis.

Roethlisberger⁴ again calls attention to the association of chronic tonsillar retention and rheumatism. He insists on the inadequacy of mere visual inspection, and even of exploration with the probe. He says that the tonsils should be squeezed out with the finger and that if the tonsils feel hard and tender and yet no debris is forced out, an incision will frequently release confined contents from one of the crypts. He advises the massage of the tonsils in cases of rheumatism, and reports a case in which this method of treatment was very successful.

J. P. Sedgwick⁵ reports a series of 22 cases of periodic vomiting, 20 of which had adenoids or enlarged tonsils. He makes note of the fact that surprising results in these cases frequently follow the removal of the adenoids and the cases reported substantiated his views.

Simon⁶ examined 86 cases of excised adenoid growths and found tubercle bacilli in 3 cases, one a very robust and apparently healthy girl with negative tuberculin reaction. He, however, does not believe that the tonsils and adenoid vegetation plays a very important part as portals of entry for the tubercle bacillus.

J. Comby⁷ from a study of 75 cases of asthma in children, in general concludes that adenoids or nasal catarrh are never etiological factors, and the course of the asthma cannot be influenced by operation on those structures.

To determine the frequency of tuberculous involvement of the

¹ *Annals of Surgery*, June, 1912, p. 785.

² *Journal of the American Medical Association*, 1912, vol. lviii, p. 1192.

³ *Medical Clinic*, December 10, 1911.

⁴ *Münchener medizinische Wochenschrift*, *Journal of the American Medical Association*, March 30, 1912, vol. lviii.

⁵ *American Journal of Diseases of Children*, April, 1912, vol. iii.

⁶ *Beiträge z. klin. der Tuberkulose*, 1912, vol. xix, No. 2.

⁷ *Archives de Médecin d'Enfants*, October 1911, p. 721.

pharyngeal tonsil, W. Sobernheim and Richard Blitz¹ carried out a series of researches on 120 children. These children were first tested by the von Pirquet method for a tuberculous reaction. The pharyngeal tonsil was then removed, and after a given length of time they were again tested. In none of the cases where there was a positive result before the operation, did any show a negative afterward, but a few who were negative before the operation became positive afterward. They then endeavored to find tubercle bacilli in the pharyngeal tonsil. In 25 cases the pharyngeal tonsil was removed and then ground up in a mortar and treated with antiformin. After centrifugation of this fluid, a drop was taken for examination for tubercle bacilli but in not a single case were any tubercle bacilli found. They then examined 10 of the pharyngeal tonsils histologically, but in none of these was there any evidence of tuberculosis. The authors therefore conclude that the pharyngeal tonsil never acts as a port of entry for tubercle bacilli into the body. As a criticism of this conclusion it seems evident that should disease work its way into the pharyngeal tonsil it would undoubtedly spread to the neighboring neck glands, and, therefore, the removal of the pharyngeal tonsil only would not remove the disease focus and they would still get a positive von Pirquet reaction. Also, the bacteriological experiments are not conclusive, as it is well known that tubercle bacilli, even when there is marked tuberculosis of the tonsils, are most difficult to find by staining. By far the best method of determining the presence or absence of tuberculous lesions in the tonsils is histological examination, and this method of examining the tonsils was only tried in 10 cases. It has been well established by a large collection of statistics from numerous authors that the pharyngeal and faucial tonsils show tuberculous changes in about 4 per cent.

Aprosexia. Weber² calls our attention to the fact, that while *aprosexia due to adenoid vegetation* has usually been thought to be caused by the nasopharyngeal obstruction, recent investigations have pointed out as a possibility that the aprosexia may be due to a beginning myxedematous condition. While it may be that in some cases the thyroidism is the cause of the aprosexia, it has been shown that enlargement of the thyroid gland may result from some form of infection, and that there is a strong possibility that, in certain cases, this infection may originate in the tonsillar structures of the throat.

Another interesting article, in explanation of the aprosexia which follows not only enlargement of the pharyngeal tonsil but also other chronic diseases of the nasopharynx and sphenoidal sinus, is that by Professor Citelli.³ Citelli says that anatomically there is a more or

¹ Archives f. Laryngologie und Rhinologie, 1911, vol. xxv, p. 121.

² La Ped. prat., December 5, 1911.

³ Zeitschrift f. Laryngologie, 1912, vol. v, p. 512.

less close connection, both of a topographical and a circulatory nature, between the pharyngeal tonsil and the hypophysis cerebri, and that also a similar relation exists between the central hypophysis and the sphenoidal sinus. Further, his histological and pathological researches have shown that the central hypophysis in adenoid individuals is often in a condition of hypersecretion, which is sometimes associated with hyperplasia of the glandular element. He opposes, however, Poppi's theory concerning the relation of the central hypophysis to the nasal pharynx. Poppi's theory is that the primary lesion starts in the hypophysis and produces the hyperplasia of the pharyngeal tonsil, whereas Citelli believes that disease of the pharyngeal tonsil or of the sphenoidal sinus produces a pathological condition of the hypophysis, which, in turn, causes the symptoms so often seen in these cases. He says that frequently the symptoms associated with the enlargement of the pharyngeal tonsil can be relieved by the administration of an extract of the pituitary bodies, but that, for a lasting cure, removal of the pharyngeal tonsil is necessary.

Removal of Tonsils. In regard to the mooted question as to the *possibility of recurrence of enlarged pharyngeal tonsils after removal*, Thomas Godfrey¹ says that, in operating on children under four years of age, there is a decided risk of recurrence, even if the growth has been thoroughly removed, and that as the child grows older this chance of recurrence becomes less up to the age of seven when it is practically *nil*. He reports one case in which he removed the second adenoid growth eighteen months after the first one.

It is probable that, in some cases, we actually see a true recurrence of the adenoid tissue in the vault, but the large majority of cases of recurrence are due to the faulty removal. Sometimes there is a compensatory hypertrophy of the lateral folds of the pharynx which tends to occlude the nasopharynx itself and causes symptoms of nasal obstruction.

The comparative ease with which the large majority of children undergo an operation for the removal of the faucial and pharyngeal tonsils has led a great many to believe that the operation should be considered as a very minor one. Max Levy² utters a very timely *warning* in the review of some of the unfortunate sequences which may follow upon the removal of the pharyngeal tonsil. He mentions severe hemorrhage which, in some cases, has been fatal, the removal of a portion of the Eustachian tube by unskilful manipulation, the bruising of the soft palate, stripping of the mucous membrane off the pharyngeal wall, but calls particular attention to the infections which, in a mild degree, are very frequent. He reports a number of cases of severe sepsis following this operation, two of which cases died, one from pleuritis

¹ Lancet, April 20, 1912, p. 1054.

² Zeitschrift f. Laryngologie, Rhinologie, etc., 1912, vol. v, p. 247.

and the other from meningitis following upon acute inflammation of the middle ear which began the fourth day after the operation. He calls attention to the importance of keeping the children away from all possibilities of infections from contagious diseases after this operation, and especially diphtheria and scarlet fever.

Much has been said recently concerning the *effect of the removal of the faucial tonsils upon the voice*. J. H. Pearson,¹ in an effort to get at the truth of this subject, gives the results of enucleation of the faucial tonsils on a series of 53 unselected cases. Concerning the speaking voice, in 32 cases it was unaltered; in 19 cases the patients believed that their voices were stronger and clearer; in 2 cases there was some nasal intonation due to vertical contraction of the scar at the site of the operation, and in 2 cases, the patients believed that their voices had become thickened. Of the 53 cases reported, 10 of them were singers, 9 amateurs and one professional. All of the amateurs stated that their voices had been improved as the result of the operation, that the voice was stronger and clearer, and could be sustained for a longer time without any feeling of strain. There was no diminution of range in the voice or impairment of its quality. The professional singer expressed herself as quite satisfied with the result, except that the voice occasionally cracked on taking high notes. This, however, she attributed to want of practice as she had not been using her singing voice so much as formerly. Her voice has lost none of its richness, and she could change registers as easily as formerly. In this case the tonsillar fossa was obliterated, the posterior pillars had become fused to the anterior surface of the posterior pillars and there was a slight vertical contraction on the right side which produced a little lowering of the soft palate on that side.

The effect of the removal of the faucial tonsils has unfortunately been grossly exaggerated by several well-known writers during the last few years. Where there is sufficient scarring following the operation to make horizontal traction on the soft palate so that it cannot be easily placed against the posterior pharyngeal wall, there will probably be some nasal intonation to the voice. Also, in a class of patients who are generally professional singers with large tonsils and a peculiar form of voice, the removal of these large tonsils sometimes affects or destroys the peculiar quality of the voice on which the singer depended for his livelihood. But in children it is exceedingly doubtful if ever a properly done tonsil operation has the slightest influence on either the speaking or singing voice, except to improve it.

Abscess. To prevent the closure of the wound which so often follows an incision of a peritonsillar abscess, Menzel² inserts a small drainage tube made out of metal in the form of a rather large collar-button

¹ Journal of Laryngology, Rhinology, and Otology, 1912, vol. xxvii, p. 244.

² Archiv f. Laryngologie und Rhinologie, 1912, vol. xxvi, p. 436.

which has been bored out through its long axis, the small end being conical in shape for ease in application. For ordinary cases only three sizes are necessary though he uses five, and their dimensions vary from 1 to 3 mm., the longer tubes being used to reach deeper abscesses. For the incision, Menzel uses a scalpel, the edge of which is parallel to the back, which feature prevents a conical incision. The incision should not be more than 1 cm. long, and the drainage tubes can be introduced with a pair of forceps. The broad flange at the base resting against the surface of the tonsil prevents it from falling into the abscess cavity, and the small head in the abscess cavity prevents it from falling back into the throat. The tubes should be left in for about one day, and never more than two days.

THE LARYNX

Laryngeal Tuberculosis has been studied during the last year with a great deal of enthusiasm. The success which has attended modern treatment in these cases which formerly were supposed to be incurable has stimulated laryngologists in this country and abroad to the further study of its pathology, to better their technique, and to determine which method seems to promise the greatest success with the least discomfort and worry to the patient. It is good to note that at least in this field of laryngology there is gradually evolving a unity of opinion as to the best method of treating and combating this disease. There is now little confidence placed in the value of medicinal measures, except possibly for the control of pain and to relieve secondary infections. As far as the actual cure of the tuberculous disease is concerned, surgical measures, such as curetting, removal of the epiglottis, and the electrocautery, are alone able to give satisfactory results.

Concerning the possibility of the occurrence of a true primary tuberculosis of the larynx, Schreiner¹ reports an interesting case in which a complete post mortem was performed, with microscopic examination of almost all of the different organs. Clinically, the patient had for a year and a half been suffering from hoarseness, and, when examined, presented a typical picture of laryngeal tuberculosis, and tubercle bacilli were found in the sputum. However, in spite of frequent examinations by different physicians, no clinical evidence of any disease of the lungs could be found, and it was supposed that this was a case of primary laryngeal tuberculosis. At the postmortem, changes in the larynx and tonsils were found to be typical of tuberculosis, but no tubercle bacilli were found; the lungs themselves were found to be absolutely free. There was, however, an adhesive pleuritis on the right side, a small calcareous centre in the lymph node situated on the

¹ Archiv f. Laryngologie und Rhinologie, etc., 1912, vol. xxvi, p. 424.

right hilum, and a small² grayish centre in the periphery of the lymph node on the left hilum. Upon microscopic examination of the lymph node from the right hilum, a small conglomerate tubercle was found showing evidence of retrogressive changes. Schreiner believes that in this case the laryngeal and tonsillar infection was due to a secondary invasion after the first involvement of the lungs had practically healed, and hence he regarded the case as one of primary laryngeal tuberculosis. He says, however, that theoretically it might be possible that there was once an active process in the lungs which set up a latent infection in the larynx and tonsils, and then healed up.

This case shows the impossibility of demonstrating a primary laryngeal tuberculosis unless there has been a complete painstaking post-mortem examination. Also it would seem that Schreiner has missed an important point in not recognizing that perhaps we had a primary tonsillar infection which led to the secondary laryngeal involvement.

There is one medicinal method of treating laryngeal tuberculosis which perhaps may be of some value. This is Pfannenstiel's so-called *two-route method of giving iodine* which has already been described in the *Journal of the American Medical Association*, July 16, 1910, p. 264. He¹ has recently again published his method and technique and it may be well to recall this method of treatment to our readers. Pfannenstiel gives potassium iodide internally and then applies ozone or hydrogen dioxide externally to the lesion, the combination of the two drugs in the lesion generating nascent iodine; 3 grams of potassium iodide should be given daily in fractional doses, and then there should be applied almost continuously ozone, or hydrogen peroxide in a 2 or 3 per cent. solution, acidified with 1 per cent. acid. As far as laryngeal tuberculosis is concerned, the treatment will be found effective only where there is local ulceration. As a supplementary adjunct to surgical procedures in the larynx, this method may be of distinct value, as mentioned by Arnoldson² in his 240 page monograph on Laryngeal Tuberculosis. Arnoldson also mentions the fact that tuberculosis of the throat is almost invariably secondary, and that local medicinal treatment has no influence on the course of the disease. While a spontaneous cure in some cases is possible, it is so rare that it should never be counted upon, and the best results will follow radical endo-laryngeal operation, including amputation of the epiglottis combined with cauterization, and the two-route Pfannenstiel method of giving potassium iodide.

The use of *fulguration as a method of combating laryngeal tuberculosis* is suggested and advised by W. Freudenthal.³ He says that the method of application is simple. The ordinary high frequency current should

¹ Deutsch. medizinische Wochenschrift, December 28, 1911, vol. xxvii, No. 52.

² Hygiea, August, 1912, vol. lxxiv, No. 8.

³ Laryngoscope, 1912, vol. xxii, p. 971.

be connected to a handle to which is attached a strong copper wire covered with hard or soft rubber to insure insulation, and which can be bent as required to suit the individual larynx. Several applications of only a few seconds' duration should be made at each sitting, and it is necessary to watch the procedure, because if the sparks are not visible in the larynx, no effects can be expected. Consequently when the patient gags or closes the larynx, the current must be stopped. Freudenthal says that the benefits of this method are; (1) there is a mild caustic effect which destroys the ulcer or infiltration; (2) it is not absolutely necessary, as it is with the galvanocautery, to be so careful in trying to hit just a certain point, though it is best to direct the spark toward the affected spot; (3) there is a distinct antiseptic effect from the ozone produced by the current; (4) administration is easy and there is very little reaction and no edema of the larynx following its use. While the few cases which he has treated have been so satisfactory that he has felt justified in making this preliminary statement, Freudenthal has yet not given this method a thorough trial.

One of the debated questions in the treatment of laryngeal tuberculosis is the use of *tuberculin*. While the large majority of laryngologists are disinclined toward its use, there are some that believe that, in properly selected cases, its use is attended by distinctly beneficial results.

Edmund Meyer¹ says that the tuberculin treatment for laryngeal tuberculosis should be more frequently employed than it is. He, however, states that there are certain conditions which distinctly contraindicate its use, such as marked pulmonary involvement with high fever and extensive changes in the larynx. Generally the healing of the laryngeal lesion is observed only when the ulceration is superficial. Tuberculin is also of value following local surgical treatment of the larynx.

Arthur Meyer² is a strong believer in the use of tuberculin for the treatment of laryngeal tuberculosis, but recognizes its contraindications, such as marked lung involvement, high fever, intestinal complications, cachexia, or an inclination toward hemoptysis. He describes the changes in the larynx which follow its use, saying that usually there is a moderate hyperemia of the larynx with slight desquamation of the epithelium, and occasionally a light thin, white, transparent deposit but never any edema or acute spreading of the tuberculous process. He advises active local treatment, except when the condition of the patient is very bad, or the disease in the larynx is extensive, or has progressed beyond the limits of the larynx to the throat. He calls attention to the advantages of the electric cautery above other surgical methods, stating that not only superficial ulcers can be easily destroyed

¹ Journal of Laryngology, Rhinology, etc., 1912, vol. xxvii, p. 329.

² Zeitschrift f. Laryngologie, Rhinologie, etc., 1912, vol. v., p. 35.

but that deep-seated tuberculous processes can be reached and that beyond the actual area of destruction. This is due to the inflammatory reaction on the surrounding regions.

Concerning the *surgical treatment of laryngeal tuberculosis*, Killian¹ says that the use of the suspension laryngoscope permits a much better view of the larynx than does either the ordinary laryngoscope or indirect laryngoscopy, and, hence, it enables the operator to be more thorough in his work and to see better what he is doing.

The use of the laryngoscope in laryngeal tuberculosis does not, in the large majority of cases, seem to be justified, as even in the most skilled hand the use of laryngoscope is, to say the least, uncomfortable to the patient as compared with indirect laryngoscopy. It is impossible in all advanced cases of laryngeal tuberculosis to attempt to eradicate the disease in this organ, hence severe surgical measures which have this as their object are, as a rule, to be discredited, except perhaps in the removal of the epiglottis. The *electric cautery* is by far the most advantageous method of treating localized tuberculosis. It has been shown by an actual experiment on animals that the effect of the cautery acts on a zone distinctly beyond the limits of actual destruction. The scar formed by the burning is thrown off by an inflammatory reaction which brings to the neighborhood new and numerous bloodvessels. This brings nourishment to a part that has been devitalized by the infiltration, and by furnishing nourishment to the newly forming tissues aids greatly in the cicatrization of the tubercle. The object, therefore, in the treatment of laryngeal tuberculosis should not be great destruction of tissue with the cautery, except perhaps in cases of tuberculoma where they interfere with the function of the larynx, but rather to the stimulation of fibrous-tissue formation and cicatrization of the tubercle.

Probably the worst symptom of advanced laryngeal tuberculosis is the pain of the unfortunate sufferer.

Aurelius Retti,² in an article on the *treatment of laryngeal tuberculosis, with special consideration of dysphagia*, says that the pain in laryngeal tuberculosis is probably due to a hypersensitiveness of the supplying nerves, and that this hypersensitiveness is induced by a continuous irritation, such as we would find in ulceration, or else by the pressure of granulation tissue on the nerve endings, as in simple infiltration. As a proof of this hypersensitiveness of the nerve trunk he claims that pressure over the entrance point of a sensitive internal laryngeal nerve into the larynx will cause a certain amount of pain, also a tickling sensation in the throat with cough. Retti says that temporary relief may sometimes be obtained by rather severe pressure on this hypersensitive nerve, and that immediately after such pressure the patient is able to swallow for a short time. As to the more permanent relief of the

¹ Deutsch. medizinische Wochenschrift, March 28, 1912, vol. xxxviii, No. 13.

² Monatsschrift f. Ohrenheilkunde und Laryngo-Rhinologie, 1912, vol. xlii, p. 910.

dysphagia, either blocking with some chemical material or else operative interference, such as resection of a portion of the superior laryngeal, must be resorted to. However, it is necessary to bear in mind that when the disease involves the upper or anterior surface of the epiglottis, interference with the internal laryngeal nerve will have no effect, as this part of the larynx is supplied with the glossopharyngeal. He reports 2 cases on which he did a double resection of the superior laryngeal nerve. Before the operation the sensibility of the larynx was normal; afterward, in both cases, the posterior surface of the epiglottis, the aryepiglottic fold and the ventricular band were anesthetic, while the sensitiveness of the vocal cords was only partially lessened. He explains this latter fact by the anastomosis of the internal branch of the superior laryngeal nerve with the recurrent nerve. In severing the external branch of the superior laryngeal nerve, Retti uses local anesthesia. He makes an incision beginning just beneath the upper edge of the thyroid cartilage, 2 to 3 cm. from the middle line of the neck. This incision runs upward, backward, for 3 to 5 cm., and is carried down through the platysma while the omohyoid muscle is drawn to one side. After going through some of the fibers of the hypothyroid muscle, the nerve itself is found lying on the hypothyroid membrane. Retti also mentions the possibility of severing the internal branch of the superior laryngeal nerve through the pyriform fossa, using for this purpose a cautery knife passed in through the mouth. The nerve will be found running in the plica nervi laryngis on the lateral wall of the sinus pyriformis.

For the relief of pain in advanced laryngeal tuberculosis, *blocking of the internal laryngeal nerve* has been advised by a number of authors, and it would seem that this procedure is not only justified but is capable of producing very efficient results.

Fetterolf¹ describes this procedure in considerable detail. He reviews the anatomy of the internal laryngeal nerve and its cervical relation, and calls attention to the fact that the nerve, in its course over the thyrohyoid membrane, describes a distinct downward loop, the lower part of this curve reaching quite to the upper border of the thyroid cartilage. For the injection, he uses a 1 per cent. solution of cocaine hydrochloride in 75 per cent. alcohol. His technique is practically that recommended by Hoffman. The patient is placed in a recumbent position with a pillow under the shoulder and the head extended and rotated away from the side of the neck to be injected. With an aniline pencil the posterior part of the thyrohyoid interval is explored until a tender spot is found, corresponding to the position of the internal laryngeal nerve. With the thumb and fingers of the left hand the larynx is steadied and the needle inserted through the skin, where it seems to enter a cavity in which the point can be freely moved. It is

¹ Annals of Otology, Rhinology, and Laryngology, March, 1912, vol. xxi, p. 128.

gradually pushed deeper, and moved around in an attempt to elicit the pain in the ear which would indicate that the point of the needle has come in contact with the nerve. Actually, however, he could elicit this reflex in very few of his cases, and when it did not appear he simply pushed the point of the needle to the depth of a little less than 1 cm. The first push on the piston of the syringe is intended to deliver only a drop or two in order to determine by the patient's coughing whether or not the point of the needle has pierced the laryngeal mucosa and entered the lumen of the larynx. If there is no cough, a few more drops are forced out and the resulting burning sensation allowed to disappear. This takes but a minute or two, and then the remainder of the contents of the syringe is slowly injected into the neck. A total of twenty or twenty-five minutes is used for each injection. To determine the extension of the solution when injected in such a manner, Fetterolf experimented on the cadaver with a saturated solution of methyl blue. In seven of the nine injections the nerve was found to be stained a deep blue; in one a light blue, and in one there was no stain at all as the fluid had gone into the larynx. In his clinical work, Fetterolf noticed somewhat unfortunate results in 4 cases; in one, the insensibility of the larynx caused retention of the sputum, but this patient was almost moribund at the time of the injection; in another, there occurred paralysis of half of the tongue which persisted for three weeks; and in 2 cases there was great difficulty in swallowing because both sides of the neck were injected at the same time, which is a distinctly unwise procedure. Out of the 16 cases reported by the writer, 7 had complete relief after one injection, 3 complete relief after two or more injections, 4 partial relief, and 2 no relief.

J. Garel¹ recommends, for injection of the internal laryngeal nerve, novocain and adrenalin in salt solution, and advocates very strongly the method of Hoffman as the best method of injection.

Malignant Disease of the Larynx. An interesting case of malignant disease of the larynx is reported by Julius Broeckhaert.² A man, aged fifty years, when first seen had a tumor which blocked almost the whole lumen of the larynx so that tracheotomy was at first thought necessary. The patient, however, after his entry into the hospital became gradually better, and the growth was rather easily removed with forceps in several large ill-smelling necrotic pieces. The wounded surface healed easily and in a few days the patient was well without any sign of tumor in the larynx. There was a slight recurrence after a few months on the left vocal cord near the anterior commissure, a portion of which was removed, and, when examined histologically, proved to be a *hyalin adenocarcinoma*.

¹ Annals des mal. de l'Oreille, etc., 1911, p. 637, No. 7.

² Zeitschrift f. Laryngologie, Rhinologie, und ihre Grenzgebiete, 1912, vol. v, p. 51.

St. Clair Thomson,¹ in discussing *intrinsic cancer of the larynx*, says that there is probably no other region of the body where operation for cancer can show anything like the satisfactory results that can be obtained when the disease occurs in the interior of the larynx and is removed by the laryngo fissure. In the 10 cases reported, he had no deaths from operation; 3 of the 10 cases died; 1 from local recurrence, 1 from recurrence in the tongue, and 1 from other causes fourteen months after the operation. All the other cases had remained well up to the present date, which made the length of time after the operation from one year and three months to seven and a half years. Thomson also says that his experience has supported the claims of Felix Semon, namely, "that there is little or no anxiety as to the return of intrinsic cancer if the larynx remains free for twelve months."

In cases of *inoperable cancer of the throat, neck, and face*, Joseph Beck² suggests the use of an autolytic solution made in accordance with the theory of Cohnheim. This theory is that at birth there are nests of embryonal epithelial cells distributed all over the body, and that these cells always remain quiescent until about the fortieth year of life. In all embryonal tissues, and also in carcinoma cells, there is a substance which is inimical to the growth of the embryonal cell nest, and that this substance existing in early life prevents the outbreak of the cell nest during these years. This substance may be obtained either from the carcinoma itself, in which case it is preferable to take an enlarged gland so that the substance can be obtained in a sterile solution, or from the body of the fetus between three and six months of age. If the fetus is used, the entire body, except scalp and brain should be used. To prepare the solution, the material is cut into small cubes under strict aseptic precautions, each cube being about 1 cm. square. They are placed in a jar of normal salt solution with twenty times the volume of salt solution as gland or fetus. To this solution is now added thymol crystals, 20 grains to a pint of solution, and on top of this is poured a quantity of sterile oil to prevent contamination. The jar is then carefully closed and placed in an incubator at a temperature of 37° for sixty days when it is ready for use. Beck has tried this method of treatment in 3 cases, in only 2 of which, however, has he had time to notice the effects. In the first case, after three months of treatment, some nodules which were present previous to beginning the treatment remained quiescent and there was no recurrence at the point of the neck wound of the first operation. The other case was one of carcinoma of the larynx, with secondary infection of the glands of the neck, the cervical glands were removed to make the autolytic solution with which the patient was treated for about three months. Unfortunately, at the end of this time, the patient died of pneumonia

¹ Medical Press, 1912, p. 196.

² Annals of Otology, Rhinology, Laryngology, March, 1912, vol. xxi, p. 198.

following exposure. There was, however, positively no increase in the laryngeal growth during the three months of treatment. Unfortunately, a postmortem examination was not permitted.

Laryngoscopy. Probably the most important advance in laryngoscopy during the last year is the invention of the suspended laryngoscope by G. Killian¹. Killian discovered, while endeavoring to demonstrate the larynx of a cadaver, that by suspending a laryngoscope from a cross-bar placed above the body, the weight of the head acting against the fixed laryngoscope opened up a very good view of the whole throat, so that he was able to see the mouth, the hypopharynx, the opening into the esophagus, a small portion of the esophagus itself, the whole of the larynx and a portion of the trachea without changing the laryngoscope or the body. Realizing that such a view would give infinitely more space to one operating upon the larynx, he started out experimenting on the cadaver and gradually evolved his apparatus, the suspended laryngoscope, and he found, much to his astonishment, that patients bore this method of direct laryngoscopy comparatively well. In the present model of the suspended laryngoscope, the supporting handle is about 32 cm. long. The laryngoscope proper or tongue spatula is placed on the end of the handle at a right angle and is so fastened that it can be easily removed so that different sizes and shapes can be readily attached as desired. To the lower end of the handle is attached a U-shaped piece of metal with its convexity to the operator's left side. This holds a plate which rests against the upper teeth, and on this tooth plate is a ridge which, catching on the inner side of the upper teeth, prevents the spatula from sliding out of the mouth. An adjustable screw enables the operator to bring the tooth plate closer to the spatula or further away as desired. The upper end of the handle is curved gradually downward over the chin of the patient, and ends in a hook which bends in a reverse direction. This hook catches over the horizontal arm of an adjustable gallows which is fastened to the operating table. The gallows is so made that both a forward and backward and also a lateral and upward motion can be obtained by means of screws, and in this manner the suspension laryngoscope can be put in any position desired, or raised to any height. This instrument can now be obtained in this country and must be seen itself or in illustration to be understood in its detailed mechanism.

In using the suspended laryngoscope, Killian prefers, for anesthetic purposes, the use of scopolamine and morphine, and a little ether if it is required. When anesthesia is complete, the patient is brought to the edge of the table so that the head hangs free over the end. The gallows is fastened to the table and roughly adjusted. The mouth is opened and the tongue forcibly drawn outward and held in this position with tongue forceps, while the tongue spatula is then passed

¹ Archiv f. Laryngologie und Rhinologie, etc., 1912, vol. xxvi, p. 277.

into the mouth, down into the throat over the epiglottis until it reaches the region of the arytenoids. The tooth plate is adjusted so that the shelf or ridge catches on the inside of the front upper incisors. The laryngoscope is now hooked to the gallows and the latter adjusted by means of the screws until it comes into its proper position. The assistant who is holding the head gradually releases it until the head hangs its whole weight on the spatula. The patients stand this method of laryngoscopy very well, and many of them can be kept in the suspended position for an hour or more without harm. By means of this instrument not only is a good view of the esophagus, trachea, and larynx obtained, permitting operations on these structures, but also the mouth and fauces are well shown up and the tonsils may be removed and even the vault inspected by retracting the soft palate.

An important modification of the suspended laryngoscope is that made by Albrecht.¹ Killian at first had great difficulty in overcoming the tendency which the tongue spatula had of slipping out of the mouth. This he finally did by the use of a projecting ridge on a tooth plate which engaged the inner surface of the upper incisor teeth. Albrecht found that this tendency of the spatula to slip out of the mouth was due to the fact that Killian's point of suspension was placed too far upward, so that the weight came on the end of the spatula, causing it to tilt downward and outward and the whole instrument to slip out of the mouth. Albrecht simply modified the form of the handle so as to bring the point of suspension over the greatest point of pressure, namely, the epiglottis and the base of the tongue. From the top of a short upright handle a bar is continued at right angles downward over the chin and along the neck of the patient until a point is reached directly over the epiglottis. To this part of the horizontal bar the rest of the upright portion of the handle is fastened and is continued upward, ending in a hook as in Killian's apparatus. By means of a rack and pinion on the horizontal arm, proper adjustment is accomplished so that the right point of suspension can be obtained in different individuals.

If, as claimed by Killian, this apparatus can be borne by patients for a considerable length of time without injury, it is going to have a large field of usefulness. It enables the operator to use both hands and also gives him a wider view and more room for manipulating his instruments. Not only can the larynx and the upper part of the esophagus be more easily attacked, but an excellent approach is afforded to the pharynx and the region of the fauces for the more difficult and delicate operations.

Another improved form of the laryngoscope is brought forward by Mosher.² It is made on the plan of the open speculum, but the upper leaf is hinged along its side and controlled by a lever which runs through

¹ Berliner klinische Wochenschrift, July 8, 1912, p. 1331.

² Laryngoscope, August, 1912, vol. xxii, p. 1047.

the handle. He claims that it is very useful for short examinations and short operations. The instrument can be passed into the mouth closed, and opened after it is in position.

During the last year the use of direct laryngoscopy and bronchoscopy has become more widespread, and, at the same time, its sphere of usefulness is broadening. Though primarily for the removal of foreign bodies, the bronchoscope is now being used for the diagnosis of pathological conditions, and also for their treatment.

Jackson¹ has made a study of influenzal tracheitis by direct inspection with the laryngoscope and bronchoscope. He says that in influenzal tracheitis, the tracheal mucosa is first reddened, the color deepens, then swelling begins, and, later, an exudate forms. This exudate is at first serous, later mucoid, and then purulent, and finally so thick that it is difficult to expectorate, even for a robust adult. In infants, death may occur from the patient's inability to rid the air passages of this secretion. Also the bronchi, or even the trachea itself, may be so occluded by the swollen, edematous mucosa that death actually results from the stenosis. One of the 2 cases which Jackson reports is that of a child, aged three years, who, on account of severe dyspnea, was at first intubated, and, as this gave no relief, tracheotomy was required. The dyspnea, however, recurred in twenty-four hours, and bronchoscopy was done. While the preparations for bronchoscopy were being made, the child became extremely cyanotic and the respiratory efforts ceased. The bronchoscope was quickly introduced and thick secretion removed from the trachea at the bifurcation, and from the left bronchus, which relieved a flow of pus from that side. Oxygen was passed down the bronchoscope, and in a few minutes the child's color was normal. Next day, however, the cyanosis returned due to increased swelling of the mucosa, and the child gradually sank and died. In both of the cases reported, Jackson makes special note of the absence of cough. In the first case there was no cough even when the bronchoscope was introduced, and he says that the absence of cough in tracheitis is quite common in children.

Ephraim² comments on the use of the bronchoscope as aiding in the clearing up of a difficult diagnosis. He has had 6 recent cases, some of hemoptysis, others of dyspnea, in which endoscopy showed the presence, in one, of a primary sarcoma of a bronchus; in another, a carcinoma of the lungs; and, in others, stenosis from goitre or aortic aneurysm.

The hemoptysis in one of these cases had returned periodically for three years, and bronchoscopy first revealed that the hemorrhages proceeded from varicose veins in the trachea.

Medication of the bronchi through the bronchoscope has been practised by some physicians for several years, but this method of treatment

¹ Laryngoscope, 1912, p. 130.

² Medizinische Klinik, April 30, 1912, vol. vii, No. 18.

has apparently become much more widely used during the last year. Ephraim¹ reports 161 cases treated through the bronchoscope and thinks that this form of medication has a promising future, especially in the treatment of asthma. He uses two methods: either introducing the nozzle of an atomizer under control of the bronchoscope, or, after anesthetizing the glottis and trachea, passing a flexible spray tube with the aid of a cannula. The spraying must be done with considerable air pressure. He has found that in chronic bronchitis a little iodine or a weak solution of silver nitrate is very useful, and he declares that the method is entirely harmless and frequently of decided efficiency in cases not amenable to other methods. In his experiments on normal animals, he found that the endobronchial spray penetrated into the alveolæ.

Equally beneficial results have been obtained with the bronchoscope by Gallusser.² He reports 2 cases of asthma in young girls over fourteen years of age who had not received any benefit from ordinary measures. After he had sprayed the bronchi directly with the novocain and epinephrin mixture, there was no recurrence. He also reports the cure of chronic bronchitis and asthma, in 37 of 58 cases, after a single spraying. In 12 other cases the spraying had to be repeated two or three times, but a cure was finally obtained.

If asthma can be cured as readily as these authors seem to want us to believe, by one application of cocaine and adrenalin through the bronchoscope, there is indeed a bright outlook for many present sufferers. However, like many newly heralded remedies, further experience does not always justify the earlier claims of the pioneers. We can, however, believe that a physician would be entirely justified in resorting to bronchoscopy in a stubborn case.

A rather interesting series of cases studied with the bronchoscope are those reported by Kahler.³ These were cases of stenosis of the bronchi caused by dilatation of the auricle. He examined 11 cases of mitral stenosis, 1 case of pure mitral insufficiency, and 1 case of aortic stenosis. While it is well known that the bifurcation carina occupies a position somewhat to the left of the middle line in the large majority of cases, Kahler found that in ten of his patients it occupied a position almost in the middle, once to the left, and twice to the right. In three other patients who had marked enlargement of the auricle, there was a sharp bending of the left bronchus, forming almost a complete right angle. In all of the cases with dilatation of the auricle, the left bronchus was found more or less constricted, and, in some, the stenosis was very marked. In 2 cases in which the enlargement of the right heart was very considerable, the right bronchus was found to be somewhat

¹ Deutsch. medizinische Wochenschrift, November 9, 1911.

² Correspondenz-Blatt f. Schweizer Aerzte, December, 1911, vol. xli, No. 35.

³ Monatsschrift f. Ohrenheilkunde und Laryngo-Rhinologie, 1912, vol. xlv, p. 553.

flattened. The mucous membrane in the region of the stenosis was generally found considerably congested, but this might be due to the existing bronchitis. Concerning the pulsation movement of the bifurcation, the enlargement of the auricle caused the carina to move from the left to the right; this was probably due to the closer contact of the bifurcation with the aorta than is usually found. It was also seen that, in the large majority of cases, there was a pulsatory uplifting of the lower anterior wall of the flattened portion of the left bronchus. In 3 of these cases, enlargement of the auricle produced a left-sided recurrent paralysis.

Concerning *recurrent paralysis as the result of a dilated left auricle*, a very interesting case is reported by Freystadtl and Stranz.¹ In this case a post mortem was obtained, and a mitral stenosis was found, producing a very greatly dilated left auricle which pressed upon the left recurrent nerve sufficiently to produce paralysis. As the post mortem was a very complete one it was easily shown by a dissection of the nerve that there could be no other cause for this paralysis. A histological study of the musculature of the left side of the larynx showed that these muscles, that is, the tyro-arytenoideus internus and externus, had undergone degenerative changes, and a histologic examination of the laryngeal nerve showed that this structure had likewise undergone marked degeneration.

In this connection, the *method of treating a paralyzed vocal cord*, as advised by Brunings,² is worth noting. Brunings suggests the use of paraffin injections in treating unilateral recurrent paralysis where this paralysis is accompanied by a loose, flapping, atrophic cord. He makes the injection through the laryngoscope with a screw syringe to which is attached a long needle of special shape. He injects hard paraffin at several sittings directly into the paralyzed cord. He says that the result is sometimes brilliant, even as regards the tone of the voice.

¹ Monatschrift f. Ohrenheilkunde und Laryngo-Rhinologie, 1912, vol. xlv, p. 557.

² Journal of Laryngology, etc., 1912, vol. xvii, p. 330.

OTOLOGY

By ARTHUR B. DUEL, M.D.

THE keen interest which for many years has characterized the work of American practitioners in the field of otology has been especially stimulated this year by the meeting of the Ninth International Otological Congress in Boston, August 12 to 17, under the presidency of Dr. Clarence J. Blake. This was the second meeting in this country of this body, the inaugural congress having been held in New York, September, 1876, under the presidency of Dr. D. B. St. John Roosa.

The valuable scientific contributions presented, the gathering together of distinguished representatives of otology from Austria, Germany, Great Britain, France, Italy, and America, the renewal of acquaintance and the exchange of ideas, cannot have failed to broaden our knowledge and to stimulate enthusiasm for progressive effort.

At the meeting of the national and State societies, the programs have, in the main, given evidence of an encouraging degree of skilful investigation. Creditable observations have been recorded concerning the various phases of labyrinth disease, including discussions of the Helmholtz resonance theory and the labyrinth as a mathematical organ of time and space, otosclerosis, salvarsan in syphilis of the ear, sinus thrombosis, deaf-mutism and the prevention of deafness, have received the consideration to which their importance entitles them; the radical mastoid operation, conservative and modified, vaccine therapy and other phases of the treatment of otitis media, and many miscellaneous subjects, have been elaborated by reports of further experience.

Meningitis. The most interesting, and possibly the most important, report of scientific research in the field of otology during the year is the exhaustive paper by Kopetzky on meningitis.¹ This is interesting because it deals with the early recognition of otitic meningitis by chemical analysis of the cerebrospinal fluid, and because it promises an accurate diagnosis at a stage of the disease when clinical symptoms have not become convincing. It is important because, in consequence of the early diagnosis, it offers a greater hope of cure by

¹ This contribution was awarded the Prize for Research by the American Laryngological, Rhinological, and Otological Society, 1912. From the Department of Surgery, Cornell University Medical College, New York City. The Laryngoscope, June, 1912.

operative interference than has been possible heretofore in the majority of cases when the clinical picture is at all well defined.

It may justly be said, perhaps, that much of the work concerning the internal ear, to which our German colleagues have devoted so much attention, is of a theoretical rather than a practical trend. This contention may be offset, however, by the distinctly practical and perhaps epoch-making work on meningitis, reported by two of our American colleagues, Kopetzky and Haynes.

Meningitis, with its mortality of from 20 to 100 per cent., according to the variety of the infecting organism, has been one of the most, if not the most, baffling problem with which otologists have had to deal. Surgery has hitherto proved an uncertain help, and, with the possible exception of the meningococcus of Weichselbaum, the specific organisms causing the different forms of meningitis have failed to yield to serological methods. Any line of research, therefore, which gives definite promise of leading to the early diagnosis of meningitis, and which suggests the principles upon which to base adequate surgical intervention, may be justly called one of the most important contributions to medical progress of recent years.

Kopetzky's report, "Meningitis: Nature, Cause, Diagnosis, and Principles of Surgical Relief; An Experimental and Critical Study," was first presented before the American Laryngological, Rhinological, and Otological Society, Philadelphia, May 13 to 15, 1912, and summarized before the Ninth International Otological Congress, Boston, August 12 to 17, 1912.

In order to render his argument clear, Kopetzky stated his general conclusion in the beginning: "*All the symptoms that characterize meningitis are due fundamentally to common factors, whether the invading bacteria is one or another of the various organisms found standing in casual relationship to the lesion: To the poisoning of the central nervous system by the invasion of microbic organisms and the action of enzymatic ferments plus the products of brain metabolism which result in an acidosis of the tissues involved, producing an increased tension of the cerebrospinal fluid with disturbance of its normal circulation.*"

"*Finally relief of the symptoms may be accomplished by relieving the heightened intracranial tension and combating the general effects of the action of the poisons on the central nervous system.*"

Assuming a familiarity with the clinical picture presented by cases of meningitis, the author proceeded to a closer study, historical, experimental, and clinical, of increased intracranial tension and its correlation to the symptom-complex observed in meningitis. Investigation along this line gave ample material to substantiate this contention regarding the existence of an increased tension of the cerebrospinal fluid in meningitis. The evidence adduced was summarized as follows:

"1. That there is an analogy in the symptoms exhibited by brain compression and by those brought on by meningeal tissue reactions to microbic infection.

"2. That the infection of the central nervous system, particularly in the investing membranes of the brain, results in an increase in the tension of the cerebrospinal fluid with functional disturbances of the vagus, the vasomotor, and the respiratory centres.

"3. That these symptoms dominate the clinical picture of meningitis, modified to some extent by other factors, hereinafter to be discussed.

"4. That evidence of the increasing tension is obtainable by repeated manometric measurement of the blood pressure, by the systemic and repeated study of the fundus of the eye, the results of lumbar puncture, and a keen observation of the character and rate of the respiration at the bedside."

In the consideration of the factors which, in themselves, are of importance as assisting in causing the increased tension, and which, therefore, to some extent modify the clinical picture, the principal problem is stated first, followed by the evidence upon which the conclusions are based:

"In the production of increased tension of the cerebrospinal fluid the edema of the brain tissue itself, in addition to an edema of the tissues of the investing membrane, is the principal factor. The former impinges on the available space in the cranial vault, and the latter additionally interferes with the free circulation of the cerebrospinal fluid."

An elaborate study of some of the fundamental principles of cerebral and meningeal edema follows, being based upon the contention of Martin H. Fischer that *the cause of edema resides in the tissues themselves*.

Tables of the observations and experiments which were made by the author are given below. He disclaims basing any final conclusions on these experiments, promising to report subsequent work, but expresses the opinion that they are at least indicative of the correctness of Fischer's contention.

The tables of observations and experiments follow:

TABLE I

No.	Clinical diagnosis.	Free acidity.	Reaction to litmus.	Degree of acidity in terms of n/10 HCl solution in 100 c.c. of fluid.	
38.	Tuberculous meningitis	—	Neutral	0.03618	or 3.6%
40.	Purulent (otitic) meningitis	—	Neutral	0.01809	or 1.8%
41.	Anterior poliomyelitis	—	Neutral	0.72236	or 7.2%
42.	Meningococcus meningitis	—	Faintly acid	0.50652	or 5.0%
43.	Normal fluid	—	Neutral	Alkaline.	
45.	Anterior poliomyelitis	+ (?)	Faintly acid	0.578879	or 57.8%
46.	Tuberculous meningitis	—	Neutral	0.028944	or 2.8%
47.	Tuberculous meningitis	—	Neutral	0.028944	or 2.8%
48.	Tubercle of cerebellum	—	Neutral	0.028944	or 2.8%
49.	Cerebrospinal rhinorrhea	—	Faintly acid	0.028944	or 2.8%
50a.	Cerebral embolism ¹	—	Neutral	0.07236	or 7.2%
50b.	Cerebral embolism	—	Neutral	0.057888	or 5.7%
50c.	Cerebral embolism	—	Neutral	0.057888	or 5.7%
51.	Anterior poliomyelitis	—	Neutral	0.07236	or 7.2%
54.	Purulent (otitic) meningitis	—	Neutral	0.047034	or 4.7%
55.	Anterior poliomyelitis	—	Neutral	0.021908	or 2.1%
56.	Idiocy amaurotic type	—	Neutral	0.0094068	or 0.9%
57.	Purulent (otitic) meningitis	—	Neutral	0.028944	or 2.8%
58.	Cerebral embolism ¹ after recovery of symptoms	—	Neutral	0.0037888	or 0.3%
59.	Tuberculous meningitis hydrocephalus	—	Neutral	Alkaline	
60.	Tuberculous meningitis (acute case)	—	Neutral	0.010854	or 1.0%
61.	Chronic hydrocephalus	—	Neutral	Alkaline	
62.	Chronic hydrocephalus	—	Neutral	Alkaline	
63.	Meningeal symptoms following resection of internal jugular. No real meningitis	—	Neutral	Alkaline	
64.	Otitic sepsis with meningeal symptoms. No meningitis	—	Neutral	Alkaline	
65.	Normal fluid	—	Neutral	Alkaline	
65a.	Meningococcic meningitis	—	Neutral	0.010854	or 1.0%
67.	Meningococcic meningitis one week after improvement set in. Patient now conscious	—	Neutral	Alkaline	
68.	Tuberculous meningitis	—	Neutral	0.01809	or 1.3%
69.	Tuberculous meningitis	—	Neutral	0.028944	or 2.8%
70.	Meningococcic meningitis	—	Neutral	0.03618	or 3.6%
71.	Meningococcic meningitis	—	Neutral	0.03618	or 3.6%
72.	Chronic hydrocephalus	—	Neutral	0.0123012	or 1.2%
73.	Fulminating type, purulent otitic meningitis	—	Neutral	0.03618	or 3.6%
74.	Meningism accompanying scarlet fever	—	Neutral	0.03618	or 3.6%
75.	Tuberculous meningitis	—	Neutral	0.07236	or 7.2%

The finding is untrustworthy, as free acidity was found and upon tests to determine its nature free hydrochloric acid was found, probably uncleanness in beaker.

¹ This case seen by the writer was thus diagnosticated. As recovery took place, definite diagnosis is still an open question. During high degree of meningeal symptoms fluids were examined, fluids Numbers 50, 50a, 50b, 50c, twenty-four hours apart. Fluid 58, a few days later, when meningeal symptoms had almost disappeared.

TABLE II

Nature of fluid tested.	Original volume.	Height in mm. of the swollen fibrin, at designated time.		
		3 hours.	6 hours.	24 hours.
Fluid = 0.028944 gram HCl	10	20.25	20.50	20.75
n/10 HCl	10	50.00	50.00	50.00
n/10 HCl	10	50.00	50.00	50.00
Sterile, distilled water	10	20.00	20.50	20.50

TABLE III

Nature of fluid tested.	Original volume.	Height in mm. of the swollen fibrin, at designated time.		
		3 hours.	6 hours.	24 hours.
Fluid = 0.028944 gram HCl	10	20.50	20.75	20.75
n/10 NaOH solution	10	40.00	50.00	50.00
Sterile, distilled water	10	10.25	10.50	10.50

TABLE IV

Nature of fluid tested.	Original volume.	Height in mm. of the swollen fibrin, at designated time.				
		½ hour.	1 hour.	1½ hours.	72 hours.	108 hours.
Fluid = 0.0123012 gram HCl	10	10.25	10.50	10.75	20.25	20.00
Fluid = 0.03618 gram HCl	10	10.50	20.00	20.00	20.75	20.75
n/100 NaOH solution	10	20.00	20.25	20.50	20.50	20.50
Sterile, distilled water	10	10.75	10.75	10.75	10.75	10.75
n/100 HCl solution	10	10.75	20.00	20.00	20.00	20.00

TABLE V

Fluid tested.	Original volume.	Height in mm. of fibrin volume at specified time.			
		½ hour.	36 hours.	48 hours.	72 hours.
Sterile, distilled water	10	10.50	10.33	10.75	20.00
n/10 HCl solution	10	30.00	40.00	50.25	50.00
n/10 NaOH solution	10	30.00	40.00	40.25	40.50
Fluid from autolized kidney	10	20.00	20.25	20.25	80.00

Summarizing the evidence thus adduced, Kopetzky concludes "that in meningitis there is presented a condition of 'combined acidity' in the cerebrospinal fluid which interacts on the colloids of the brain and the investing membrane and adds to the vicious cycle of events by producing an edema of these tissues, which edema is still further increased by the interference in the oxygenation of the central nervous system."

Having shown that an immediate examination, after its withdrawal from the body, of the cerebrospinal fluid from cases of meningitides evidences an acidity which results in an edema of the brain-tissue and the tissues of the meninges, it follows that the swelling of these tissues necessarily presents obstacles to the circulation of the cerebrospinal fluid.

The significance of the Pacchionian bodies, the function they perform, and the explanation of the substitute for their absence in the infant, are stated. These bodies act as "the entrance gate for the fluid from the subdural and subarachnoid space into the venous blood

system." In the child they are not present during the period of life when the fontanelles are open. When the fontanelles close the Pacchionian bodies are developed, expanding and contracting with the heart and respiratory rhythm as a sort of "break-pump," regulating the flow of the fluid from the cranial spaces into the lacunæ and blood sinuses. Their absence during the period of life when the skull is yielding to the pulsations caused by the heart-beat and respiratory rhythm is significant.

A change in the consistency (thickening) of the delicate membranes of the Pacchionian bodies, according to Kopetzky, conceivably acts as a hindrance to the passage through these membranes of the fluid. Microscopic examination of these bodies, taken from a case of purulent meningitis of traumatic origin, demonstrated an increase in the swelling of the fibers of the connective-tissue elements, plus a round-cell infiltrate, besides a swelling and granulation of the cell elements, thus giving the physical evidence of edema of the Pacchionian bodies.

Attention is called to the demonstrable existence of lactic acid in the cerebrospinal fluid of meningitic subjects, and to the fact that it is present in larger amounts in those cases which are characterized by the more stormy picture of disturbances of the sensorium. The relative amounts of lactic acid found in varying degrees of meningeal symptoms, are not determined at present.

In the discussion of the causal relationship of pathogenic microorganisms to meningitides, Kopetzky says: "The mere presence of pathogenic microorganisms in the fluid from the central nervous system is of smaller moment—excepting their demonstration as a diagnostic aid—than the realization that the disease we are endeavoring to study is a succession of changes in the tissues, generally resulting from the growth within them of pathogenic microbes. In other words, the fact of importance to us here is the recognition that meningitis is the picture of an interaction between the tissues of the central nervous system and the microorganisms, and it is this interaction which in part produces the additional elements of our clinical picture. This interaction results in a destruction of tissue cells on the one hand, and the production of *toxins* and *ptomains* on the other hand."

The evidence adduced from a review of the work of others, and from the author's experiments, justified his conclusion "*that there is always present in the cerebrospinal fluid a carbohydrate which at the onset of bacterial infection is utilized by the microbes as a food, and that it disappears from the spinal fluid early in the disease, to reappear later simultaneously with a falling off in the numbers, or with the disappearance of the microorganism presented by the case.*" The estimation of the presence of the carbohydrate body in the spinal fluid, and the determination of its absence, is accomplished by means of the Benedict copper reagent, the presence of a copper reducing substance (a dextrose) in the fluid being

accepted as established. This reaction is "*one of the earliest and most reliable signs of meningitis, and later a reliable test to afford information as to the progression or retrogression of the infection of the meninges.*"

The study of the biochemical changes in the cellular elements of the central nervous system, which have an important bearing on the problem of meningitis, leads to the following conclusion: "*In the evolution of meningitis, the stasis—or the interference with the normal circulation of the cerebrospinal fluid—causes an accumulation of the products of bacterial and enzymotic activity to take place in the fluid. The bodies thus collected are nerve poisons and produce their deleterious effects directly on the cells of the central nervous system—evidence of which is seen in the clinical picture. The products of cellular degeneration thus found and collected are recognized as 'penultimate' products of disintegration of the protein constituent of the brain matter.*"

One is justified, according to the evidence, in assuming "that the normal metabolism of the cells of the central nervous system results in throwing into the cerebrospinal fluid stream minimal traces of lecithin decomposition products—namely, cholin (and other products)—the cerebrospinal fluid carries these into the blood where further decomposition ensues. Under the influence of bacterial poisons, and the other factors which we have shown are common factors in meningitides—the cerebral anemia, the edema of the tissue with its accompanying acidity, etc., the interference with the free circulation of the cerebrospinal fluid—an accumulation of these poisonous basic products takes place, and they exert their deleterious activity on the nervous tissues directly, still further damaging them. The result of all this is seen in the evidence of toxicity of the given case, as shown in the clinical picture."

In meningitides there is a decomposition of the lecithin molecular element in the nervous tissue, evidence of which is presented in the cerebrospinal fluid through the finding in it of lower quantities of cholin than the normal minimal trace. The alkaloidal body, cholin, seems to be the factor in the clinical picture which clinicians have come to regard as the "poison-effects" of the disease. The increased quantity of cholin in cerebrospinal fluids of meningitides is not so much the result of gross destruction of the lecithin content of the gray matter in the brain as it is another evidence of the stasis of circulation of the cerebrospinal fluid.

A study of the specific gravity of the cerebrospinal fluid failed to give an adequate answer to the questions at issue.

In the presentation of the argument that meningitis is to a certain extent a progressive disease, Kopetzky does not overlook the difficulty encountered in attempting to bridge the gap between the so-called "meningitis serosa" and those forms of meningitis which exhibit frankly purulent characteristics due to demonstrable microorganisms in the spinal fluid.

A study of a number of reported cases, together with the other evidences presented, leads to the conclusion "*that in meningitis we are dealing with a disease whose nature is progressive, which may terminate in recovery in its very beginning, or initial stage; or, if it advances, it eventually exhibits those frankly purulent characteristics which have caused the later stages to be termed 'purulent meningitis.'*"

In concluding this valuable study, Kopetzky emphasizes the fact that if surgical measures are to be successful in the treatment of meningitis, the condition must be recognized early, and the relief instituted promptly. "The early diagnosis," he says, "according to our findings, besides those manifestations of meningeal involvement which we, as clinicians, are wont to recognize as such, lies in the *repetition at short intervals of blood-pressure estimations*, a progressive increase in which is the first significant sign. The eye-ground examination, giving a *finding of an increased tension in the veins, swelling of the papilla*, is next in importance. The *examination of the spinal fluid, completed in all its details*, gives the final necessary termination. The pressure of its flow is noted, its physical, chemical, cytological, and, finally, its bacterial constituents determined. The chemical examination gives the quickest answer, and the *absence of a copper-reducing body*, a degree of acidity, the presence of lactic acid, albumin, and globulin in addition to the estimated increase in potassium salts, and the finding of larger amounts of cholin than normally present, or a high percentage of a neutral fat, or both—these make for a diagnosis of meningitis. Later, the cytological and the bacterial examinations bring added data, but in the event of negative bacterial findings, and positive increase in cellular elements, and a fluid which apparently is "clear," and yet gives, as a result of chemical examination, results as outlined above—then there is a strong presumption that the given case is one which is a meningitis, which presumption becomes stronger if the bedside observation substantiates these findings, by demonstrating increasing blood pressure, and other signs. It is to be noted that the chemical signs of a meningitis are obtainable some time before any other reports from the examination of the fluid are available."

It is evident that Kopetzky has made a most painstaking and accurate study of the cases which he presents, and that he has correlated facts which may prove of inestimable value in the early diagnosis of meningitis. It will require much additional investigation, however, to render these methods practicable for otologists in general, to be employed in every-day work as are blood and urine examinations, for example, and to be relied upon as accurate indications for operative interference.

Should the chemical reactions prove to be constant as an early indication of beginning infection of the meninges, a tremendous stride will have been made toward the cure of what is now looked upon as an almost hopeless condition.

At the Clinical Congress of Surgeons of North America, held in New York, November 11 to 17, Dr. Ewing W. Day, of Pittsburg, read a paper based upon his personal experience with fifty-seven cases of meningitis of otitic origin, with three recoveries. Various methods of *treatment* had been employed. Day was constrained, after careful analysis, to believe that the three cases cured were probably cases of localized meningitis rather than of general leptomeningitis.

This paper was of special value because its author had been able to secure autopsies in so many cases in which he had had the opportunity of observing the patient up to the time of death. Pictures were exhibited of many cases showing the area of meninges involved in the presence of a certain type of clinical manifestation. These were interesting, and forced upon one the conviction that an observer of such wide experience must have acquired the ability to recognize the clinical picture very early. How discouraging, then, the fact that he bewails the absence, in most cases, of definite initial symptoms which lead one to operate early enough to save the patient!

Whiting, of New York, discussing the paper, practically reiterated Day's statements, asserting that, in his opinion, no cases which were not localized meningitis had ever been saved.

The views expressed by Day and Whiting probably voice the sentiment of the majority of aural surgeons. Manifestly, any chemical test which accurately demonstrates the beginning of meningitis must be looked upon as a tremendous gain. Will Kopetzky's tests do this? It remains to be proved. Even should they fail to do all that is hoped, the work is along the right lines and deserves great credit. Another year may show great progress.

Some of Kopetzky's findings have already been verified by Jacob,¹ who has recently made a study of the cerebrospinal fluid in a series of cases of tuberculous, pneumococcus, streptococcus, cerebrospinal, and mixed septic meningitis secondary to middle-ear disease, and poliomyelitis. His findings harmonize with those of Kopetzky regarding sugar. Kopetzky, it will be remembered, employed Benedict's copper reagent with which the presence of a copper-reducing substance (a dextrose) has been demonstrated in normal cerebrospinal fluid. Jacob employed Fehling's solution in his cases. He found that sugar was absent in every case of pyogenic meningitis, pneumococcus, streptococcus, and mixed infection. In cerebrospinal meningitis it was absent during the acute stage, but returned in greater or less degree as the infection subsided. He found sugar present in tuberculous meningitis, as a rule, and invariably in poliomyelitis.

SURGICAL TREATMENT OF MENINGITIS. Along with the elaboration of the tests which bid fair to render possible the early diagnosis of

¹ Sugar in Cerebrospinal Fluid from Cases of Meningitis, British Medical Journal, October 26, 1912, p. 1089.

meningitis, there has been evolved an operation by means of which the object sought in all operations for meningitis is much more effectually accomplished. *The surgical treatment of meningitis, by drainage of the cisterna magna*, was developed by Haynes,¹ working with Kopetzky in the Department of Surgery, Cornell University Medical College. The full technique is given below.

Haynes prepares the reader of the paper for his own work by giving a résumé of the history of meningitis, a discussion of the anatomy and physiology of the parts involved, and a general consideration of the operative treatment, with a critical review of past operations. The symptoms which furnish a guide for operation are stated, and the question asked: (1) What may an operation promise? (2) When should an operation be undertaken? (3) Where should the operation be performed?

The discussion of the above points, and the answering of the above questions, leads to the inevitable conclusion "*that the cisterna magna is the best and only reasonable place for surgical interference in meningitis.*"

The surgical anatomy of the suboccipital region is briefly stated by Haynes as follows, and illustrated in Figs. 7, 8, 9, and 10:

"1. The skin and subcutaneous fascia require no mention. They are divided by a vertical incision immediately in the median line.

"2. The muscles lie in paired groups on either side of the middle line; consequently they are not divided in the operation, but merely retracted to one side. They are the trapezius, complexus, and the rectus capitis posticus minor.

"3. The nerves do not appear at all. The only one which might enter the field is the third occipital. As this is a purely sensory nerve, its division could only cause temporary numbness of the back part of the scalp.

"4. The vessels are the only structures of the soft parts which deserve more than a passing remark. They are paired arteries and veins which are connected more or less freely by anastomotic vessels which cross the line of the incision. When divided they bleed, but the hemorrhage is easily checked by clamps.

"5. The pericranium is easily stripped from the bone, and with the portions of the origins of the muscles near the middle line. It is also directly continuous with the atlanto-occipital ligament at the margin of the foramen magnum.

"6. A small median emissary vein may exist at about the middle of the occipital crest. It is not constant. If present, it may be plugged by a piece of wood or by boring into the opening with the tip of an artery clamp.

¹ The Surgical Treatment of Meningitis: Its Scope and Accomplishment, The Laryngoscope, June, 1912. Read in full before the American Laryngological, Rhinological, and Otological Society, May 13 to 15, 1912; and in part before the Ninth International Otological Congress, August 12 to 17, 1912.



FIG. 7.—Dissection of the postcervical region superficial to the trapezius muscle. A small anastomotic vein is shown crossing the line of the incision. Veins injected to make them more prominent. Dissection by Dr I. S. Haynes. Drawn by Mr. Bosse (reduced). (Haynes, original.)



FIG. 8.—Structures superficial to the complexus muscle. Dissection by Dr. I. S. Haynes. Drawn by Mr. Bosse (reduced). (Haynes, original.)

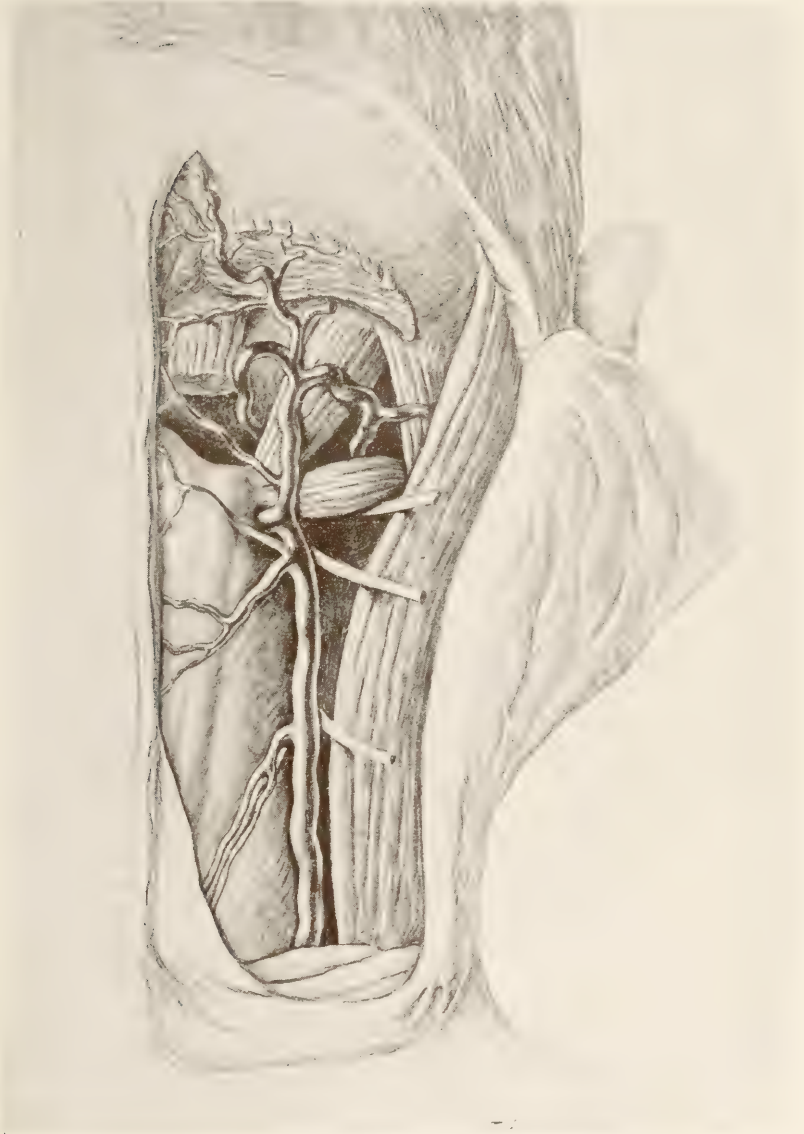


FIG. 9.—The deeper structures. The small anastomotic veins which cross the line of the incision. Dissection by Dr. I. S. Haynes. Drawn by Mr. Bosse (reduced). (Haynes, original.)



FIG. 10.—Sagittal section of the head and neck of a child. The subject had been hardened in formaldehyde and sectioned by Dr. I. S. Haynes (slightly reduced). Vertical position of brain stem. Its relation to the foramen magnum. The ease with which “corking” this foramen could occur. The large cisterna magna, its relations to the other subarachnoid spaces and especially to the occipital bone near the foramen magnum. Also the very narrow space between the foramen magnum and the arch of the atlas. The distance of the skin from the occipitovertebral angle is greatly diminished by flexion of the head and spine. (Haynes, original.)



FIG. 11.—Operation of “draining the cisterna magna.” The incision. Preparation by Dr. I. S. Haynes upon an adult male subject. (Slightly reduced.) (Haynes, original.)

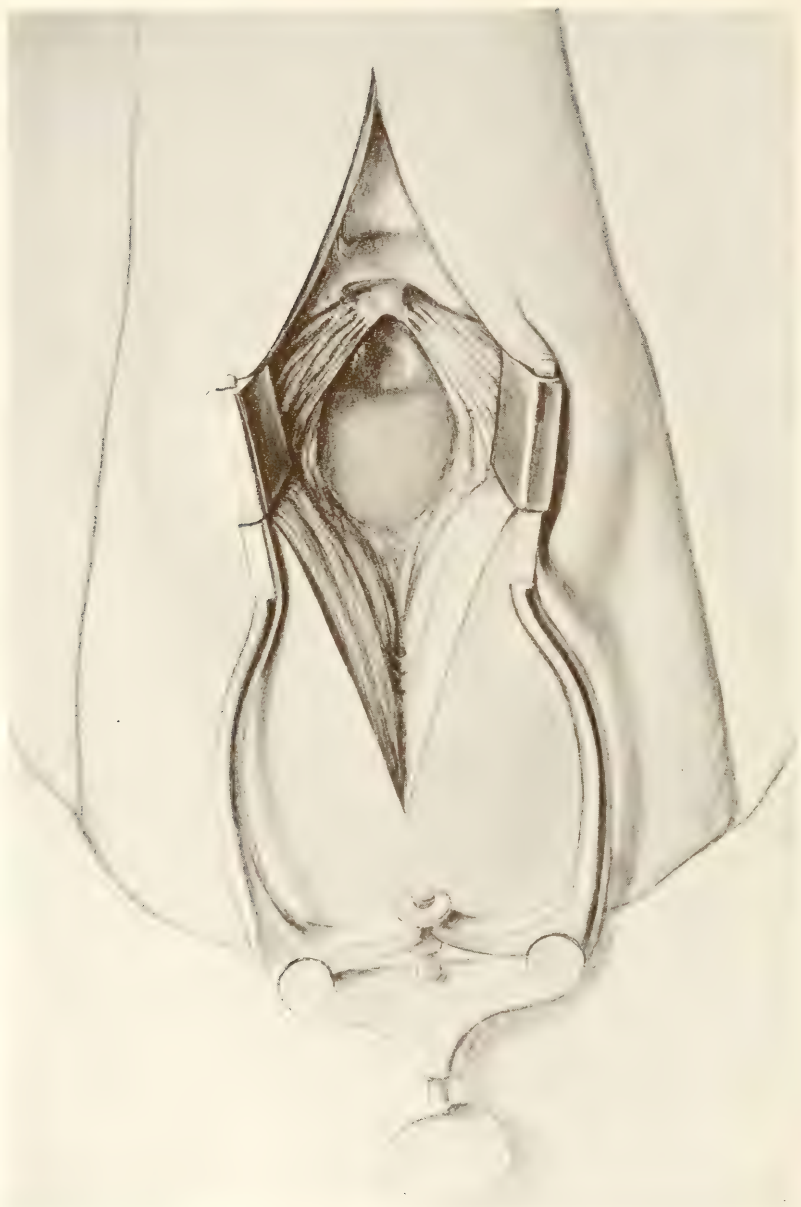


FIG. 12.—Operation of "draining the cisterna magna." The incision has been carried down to the occipital bone and posterior arch of the atlas. The pericranium with the muscles has been reflected from the occipital bone. The field is fully exposed by the aid of the self-retaining retractor. (Slightly reduced.) (Haynes, original.)

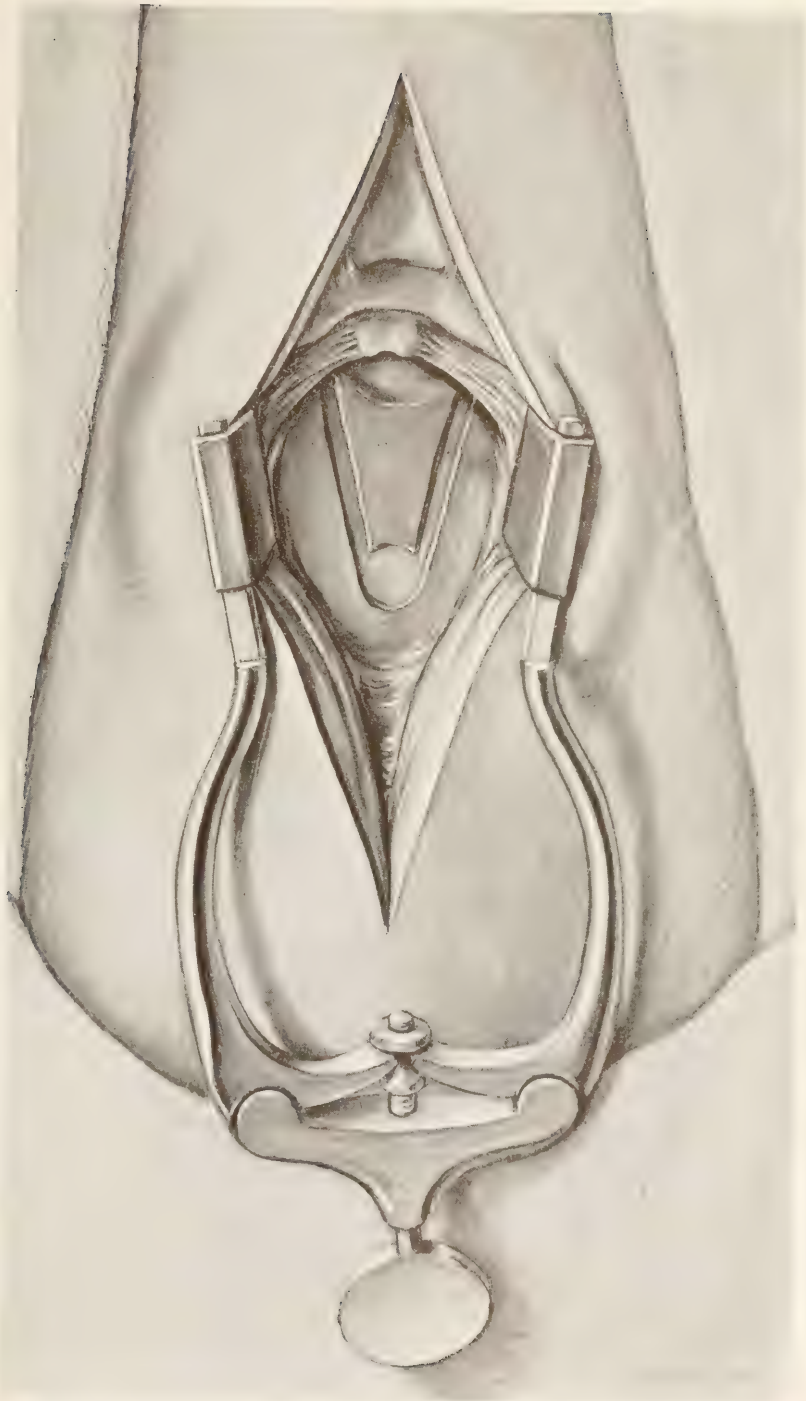


FIG. 13.—Operation of “draining the cisterna magna.” The trephine opening has been made and grooves have been cut into the foramen magnum. (Slightly reduced.) (Haynes, original.)



FIG. 14.—Operation of “draining the cisterna magna.” The wedge of bone has been removed. In this cadaver the occipital sinus was double, as shown in the illustration, and both clearly visible. (Slightly reduced.) (Haynes, original.)

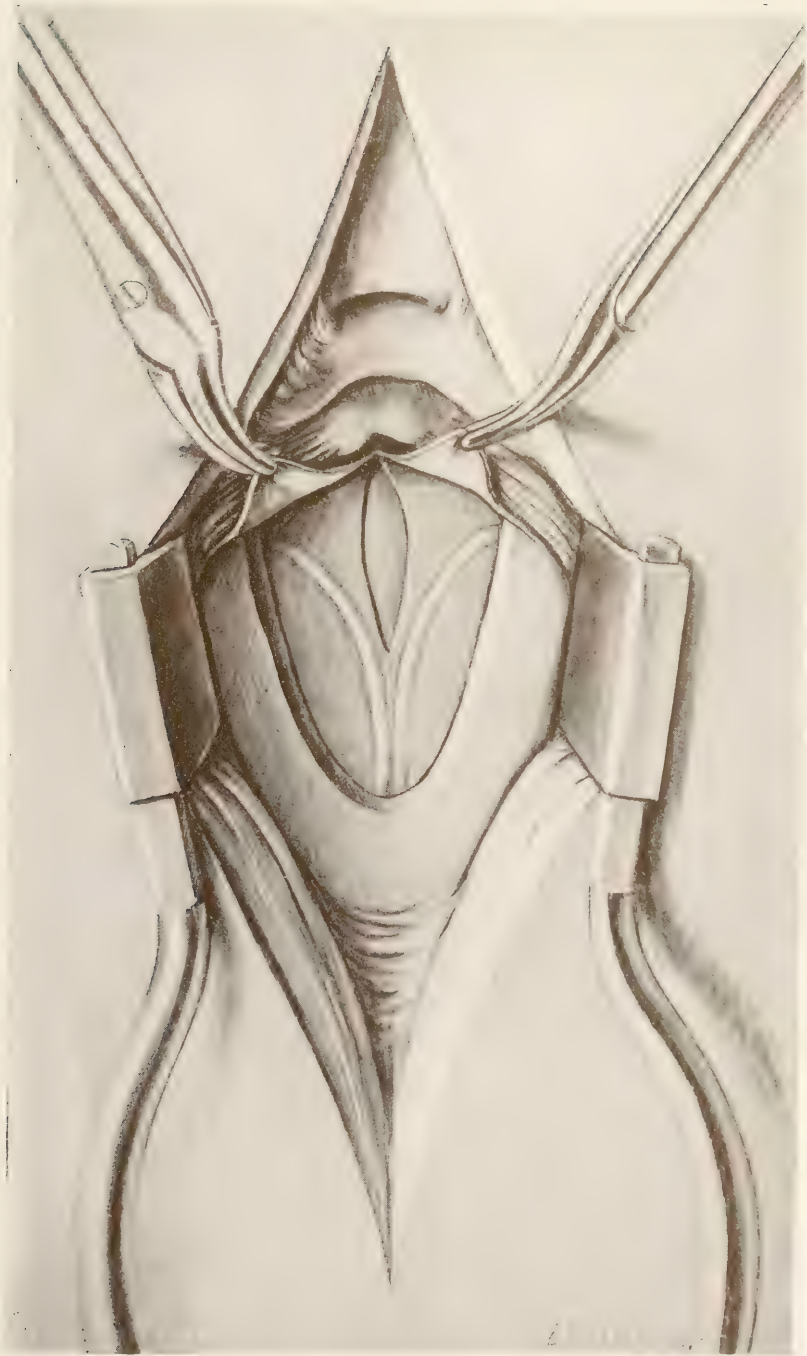


FIG. 15.—Operation of “draining the cisterna magna.” This figure and Figs. 10 and 11 have been drawn twice the natural size to render the structures more distinct. The dura has been opened between the double occipital sinus and the arachnoid is presenting. (Haynes, original.)



FIG. 16.—Operation of “draining the cisterna magna.” The arachnoid had been divided and the cisterna magna opened. Note the space between the lobes of the cerebellum and the medulla. (Haynes, original.)



FIG. 17.—Operation of “draining the cisterna magna.” The sinuses have been ligated and the dura and arachnoid widely reflected. The two arteries shown curving around the poles of the cerebellum are the posterior inferior cerebellar. They seem to be in close relation with the medulla. They are not. It is impossible to represent in an illustration the real depth of the cistern at the bottom of which lies the medulla. (Haynes, original.)



FIG. 18.—Operation of “draining the cisterna magna.” Instruments which will be found useful in performing this operation. It will be noted that the most of them are “stock” instruments, found everywhere, and do not require even mention. Attention is called to the self-retaining retractor, which is of great assistance in maintaining the wound fully exposed. Also to a bone cutter, which has a reversible cutting end that may be used in four different positions. Further, to the cerebellar “spoons or pushers,” with which the lobes of the cerebellum may be gently pushed upward and apart.



FIG. 19. The author's folding and portable head-rest attached to a common kitchen table by a webbing trunk strap. The three supports for the head are of flat malleable steel, and their shape may be changed by bending them with the hands. They are movable, and may be set in any position and then clamped.

"7. The skull deserves a longer notice. There is a great difference in the thickness of the skulls in this region in adults. Of course, in children it is very thin, with slight thickening along the occipital crest. In both classes, the thickest portion of the bone is at the occipital crest. On either side of the crest the bone becomes thinner, to again thicken up about the foramen magnum. In all cases it should be perforated with due caution.

"8. The dura is thick and firm. It is easily separated from the bone. At the foramen magnum it is the most closely attached, but can be detached from the bone without difficulty. It is continuous here with the pericranium.

"9. The occipital sinus is the smallest of all the sinuses, about 2 mm. in diameter. It is composed of two parts: a vertical part which descends in the falx cerebelli; a horizontal or anterior part, also called the sinus marginalis, which courses around the margin of the foramen magnum and opens into the lateral sinus (Poier and Charpy). They also give the following figures as to its variations: 5 times out of 50 it was very large (Dumont); absent twice in 44 cases; 10 times the marginal branch was absent; in 9 times there were two sinuses; in 33 times there was one trunk unpaired and median, bifurcating at its lower part.

"10. The arachnoid presents in this region as a membrane of considerable strength and individuality. It is closely applied to the dura, and consequently separated by a wide space from the pia beneath, over an interval corresponding to the apices of the cerebellar lobes and the sides of the medulla.

"11. The incisura cerebelli posterior. This gap between the cerebellar lobes is bounded below and in front by the medulla.

"12. Covering the surfaces of the parts will be seen the vascular pia, with the two posterior inferior cerebellar arteries (from the vertebrals) standing out conspicuously as they wind around the apices of the cerebellar lobes from its lower surface into the incisura cerebelli.

"13. If the cerebellar lobes are gently raised and separated there will be seen the opening, the foramen of Magendie, which exists in the pia extending from the cerebellum to the medulla.

"14. As to the cerebellum and medulla, our surgical and anatomical investigations do not carry us that far at this time."

The purposes of the operation are briefly stated as follows:

"1. To open the cisterna magna, relieve intracranial pressure, and restore the normal supply of 'good blood' to the 'vital centres.'

"2. To do this without danger of cerebellar hernia, or of 'corking up the foramen magnum' by downward displacement of the brain stem.

"3. To prevent shock and possible death of the patient from too sudden escape of the cerebrospinal fluid.

"4. To provide for free and continuous drainage of the infected cerebrospinal fluid and thus enable Nature to effect a cure of the disease.

"5. To afford inspection of the foramen of Magendie, and, if it be closed, reopening it.

"6. To forestall possible complications, especially hydrocephalus. If hydrocephalus is present, its relief and cure is possible by this operation.

"7. To accomplish these desirable ends by an operation of the simplest technique, in the minimum of time, with the least shock."

The steps of the operation are given as stated by Haynes (see Figs. 11 to 19):

"The scalp has been shaved and the usual preoperative measures taken to secure and maintain absolute asepsis.

"The proper position upon the operating table is maintained by the special head-rest, or by a competent, strong assistant, and sand-bags.

"The anesthetic (ether) is administered through nasal tubes beneath the sterile sheet covering the patient.

"The incision is in the middle line from the occipital protuberance to the spinous process of the axis, and carried down to the occipital bone and posterior arch of the atlas.

"Hemorrhage, slight and easily arrested, is checked by mosquito clamps and the vessels ligated.

"The periosteum is now stripped from the occipital bone, taking with it the inner portions of the origin of the attached muscles, and the occipital bone is bared for about a distance of one and one-half to two inches vertically and an inch transversely, at the foramen magnum, less above.

"The posterior arch of the atlas does not require baring.

"An emissary vein may be encountered in the midline. It is not constant. If present, it may be plugged by a wooden toothpick or by boring into it with an artery clamp.

"The self-retaining retractor is now introduced. There are two sizes of detachable blades provided, one for adults and the other for children.

"The De Vilbiss trephine (three-eighths of an inch) is applied in the midline and about one inch from the margin of the foramen magnum and the bottom of the bone removed. With the special dural separations, the dura is loosened from the bone and the De Vilbiss bone-cutter used to make two lines of incisions or grooves through the bone into the foramen magnum. The dural separator must be constantly used to detach the dura from the bone in advance of the bone-cutter. For this reason these separators are made in two sizes and with a narrow shank to easily pass through the groove in the bone.

"The wedge of bone, cut loose, is about half an inch wide at the foramen magnum and a little less at the upper border. Of course, the size may vary for each individual and according to complications. The detachment of the bone-button is carefully completed and it is removed.

"The dura presents, probably under pressure, bulging into the bone gap.

"The occipital sinus (or sinuses) will be seen, if present, showing a blue color through the dura. If the sinus is double, the dura should be incised between them. If single, it should be tied at the upper part and just beyond its bifurcation into the marginal sinuses. The special, full-curved, right-angled dural needles, right and left, are provided for this purpose.

"CAUTION. In dividing the dura, first make a very tiny incision into it, using the fine curved bistoury for this purpose. This is necessary, for should the arachnoid be so closely applied to the dura as to be divided with it, we need to prevent a too sudden escape of the cerebrospinal fluid. Should it be found that the dura has been severed alone, the incision in it should be carried up and down to the limits of the opening in the bone.

"The arachnoid wall will now bulge into the field, unless it has been divided with the dura. The amount of its bulging will give some idea of the degree of intracranial pressure. The arachnoid is slightly nicked in the middle line and the cerebrospinal fluid allowed to escape, a specimen being taken for laboratory examination. While it escapes slowly, a careful watch is maintained upon the blood pressure, pulse, and respiration by one especially detailed for this purpose. Syncope may be prevented or lessened by arresting for a moment the flow of the fluid by gentle pressure of the finger.

"As soon as the excess of fluid has escaped, open the arachnoid for the full extent of the dural opening. The condition in the cerebro-medullary angle should be very carefully investigated. Should there be an exudate about the parts, the lobes of the cerebellum should be raised and separated by the 'pushers' provided for this purpose, and the patency of the foramen of Magendie assured. It may be necessary to enlarge the opening in the occipital bone. This is easily done by the ordinary rongeurs or by the bone punch devised by the writer. A small wick of rubber or gutta-percha tissue is placed within the margins of the dura and arachnoid and left protruding from the wound. The muscles are placed and held together by two or three plain gut sutures (interrupted). The skin is closed above and below the drain with silkworm-gut, interrupted sutures. Voluminous dressings are applied, sufficiently thick to fill out the normal hollow between the head and neck.

"The patient is handled with care, remembering that the brain stem no longer has its protecting cushion of fluid. The entire operation takes from fifteen to thirty minutes."

No *surgical difficulties* were encountered in the three cases operated upon by this method, and reported in the paper under discussion. It may be reasonably inferred that none need be anticipated.

The advantages of the operation are numerous. The cisterna magna is opened at its largest and most favorable spot for its evacuation. Drainage established here effectually taps all other adjacent regions within and without the brain and cord. Not only is an exit provided for purulent cerebrospinal fluid, but relief of intracranial pressure is obtained, and blood is restored to the vital centres. Furthermore, once drainage is established, the fresh secretions of cerebrospinal fluid are more potent in their bactericidal elements than before, which increases the probabilities of a complete cure. Naturally, an exception to this must be made in cases which are moribund at the time of operation. "Hernia of the cerebellum," which has given trouble in other operations, does not complicate this procedure. The skull may be opened at the point indicated by the Haynes operation in the presence of great intracranial pressure without even a tendency toward the appearance of cerebellar hernia. The entire cerebellomedullary tract is under direct observation and surgical treatment as required. The "free drainage up to the last," which is difficult of accomplishment by other methods, is possible here. The extracranial advantages are that there is a single incision with separation, merely, of the muscles. The "furious bleeding" reported by some observers as occurring with other methods, does not occur with this. The operation is quickly done, fifteen minutes in the child and thirty in the adult, being sufficient in uncomplicated cases. Further complications (cerebral irritation and even epilepsy due to adhesions between the pia and the dura, and hydrocephalus) are prevented by operation at this site.

In conclusion, Haynes states that "The only relief is by early, free, and continuous removal of the rapidly forming cerebrospinal fluid, thus preventing cerebral compression, bulbar anemia, and paralysis and death.

"Anatomy, physiology, pathology, and surgery show the cisterna magna the place best suited for such a purpose.

"The operation which reaches this in the minimum of time, with the least structural disturbance, with freedom from hemorrhage, with maximum access to the region without cerebellar hernia, with provisions for adequate and sustained drainage, with opportunity to explore and treat adjacent parts and prevent complications, and with the greatest safety to the patient is the preferable one.

"The operative procedure here submitted for draining the cisterna magna fulfils these requirements more completely than any heretofore proposed or performed; therefore, it should be the operation of choice for the treatment of meningitis."

This operation appeals to all who have occasion to drain the meninges, and will undoubtedly supplant all other methods which have been proposed. It is easily performed, and meets the requirements of surgical intervention in meningitis more thoroughly than any other procedure.

The Labyrinth has continued to receive the close attention of a number of investigators, and the otological literature of the past year contains the usual quota of interesting reports concerning the various phases of labyrinthine research. Nothing has been presented which, by process of scientific elimination, has succeeded in reducing the numerous theories of sound perception to one generally acceptable view. The Helmholtz resonance theory continues to be the chief point of dispute.

Perhaps the most important contribution to this subject is the monograph by Waetzmänn,¹ who investigated *the applicability of the resonance theory to the explanation of the physiologico-acoustic phenomena*. The modern investigations and theories are extensively reviewed by him, in order to give the reader an idea of what has heretofore been accomplished and to encourage further work on the part of the experimenters and physiologists. There is also a discussion of physiological acoustics, and a summary of the anatomy and physiology of the parts of the auditory meatus subservient to the function of hearing, with hints and suggestions of gaps or obscurities in the present state of our knowledge, which call for renewed investigation. The Helmholtz theory of resonance is given unconditionally the preference, as compared to all other hearing-theories, for although even in its new modified form it fails to *explain all phenomena*, it does not *contradict* any, since the views of Helmholtz have been rectified and amplified in part, through recent findings, especially those of the author. The resonance theory, in part, has received additional support through these observations.

After discussing in the first part of his work the physical foundations, with Fourier's rule, and Ohm's law, the author in the second part proceeds to a consideration of the *ear as a resonance apparatus*. He begins with a thorough review of the anatomy and physiology of the parts of the auditory organ destined for sound conduction and sound perception, on the basis of the available literature. This is followed by a discussion of the physical properties of the resonators in the ear, especially as these were assumed by Helmholtz, and as the author is inclined to regard them at present, on the basis of numerous investigations. Helmholtz concluded that all resonators in the ear were equally softened, or muffled, since the degree of roughness of nearer dissonating consonances is practically the same, at equal intervals, through the entire scale. This condition, as pointed out by Waetzmänn, must not be overrated, as under neglect of the number of vibrations, the intensity alone governs the degree of roughness. Moreover, the roughness of intervals of moderate size undoubtedly diminishes with increasing height. Hence the strength of vibrations is lessened; accordingly, the higher attuned ear-resonators are less strongly softened than those with deep, proper tones. The experimentation of

¹ Die Resonanztheorie des Hörens, Monograph, Brannschweig, 1912.

Stumpf has shown that the strength of vibration does not change under a constant maintenance of the vibrations at a different height of the primary tones, which involves a narrowing of the interval of the primary tones. It is a positive indication of a stronger resonance, meaning a less marked softening of the ear-resonators in the higher tone-levels. The critical time of interruption, of the time at which the interrupted vibrations of a tone cease to be perceptible, is shorter for high tones than for deep tones, according to the findings of Mayer; accordingly, the time of subsidence must also be shorter for the higher tones. This conclusion is regarded as altogether unjustifiable by Waetzmann. Aside from the fact that in interruptions, the rising and the falling tone overlap in an entirely unknown fashion, an important part is played by the size of the difference of the intensity of resonance during the tone impetus and the interruption, in such a way that in great differences the weaker one appears as zero. We know that the high tones, with the same strength of stimulus, determine a considerably stronger intensity of sensation than the deep tones. Conclusions as to the time of subsidence are therefore not permissible, and the assumption of equal times of subsidence for tones of unequal height is by no means refuted through these investigations on interrupted vibrations.

From his trill-experiments—meaning up to what rapidity a trill is still distinctly recognized as such by the ear—Helmholtz concluded that the degree of the softening is approximately found for the ear resonators through the assumption that the intensity has dropped to the tenth part of the original value after about ten vibrations. While admitting the correctness of the conclusion for the examined tone *A*, the extension of this rule to all tones is not accepted by Waetzmann.

The experiments of Abraham and Schaefer, later on also those of Waetzmann, showed that trills of equal rapidity are possible in all octaves; at any rate, that in the middle portion of the scale the rapidity of just barely recognizable trills is practically independent of the height of the two trill tones, indicating fairly equal times of subsidence. Finally, the higher or deeper tones of the trill were lengthened by Waetzmann. According to Helmholtz's assumption of a longer subsidence of the ear resonators attuned to the deep tones, a blurred trill was to have been anticipated on prolongation of the deep tone. No difference could be established by Waetzmann in the two cases. Hence, Waetzmann's assumption of equal time of subsidence and different softening, namely a less marked softening of the ear resonators attuned to the high tones, is preferable to the opposite view of Helmholtz. It is pointed out by Waetzmann himself, however, that the truth may lie midway between.

The special properties of the fibers of the basilar membrane are

taken up to the close of the chapter, and the author refutes the objections of Wien against the resonance theory.

The recent physiologic experimentation in regard to the resonance theory such as lesions of the cochlea and hearing tests, prolonged action of the loud tones and the establishment of the anatomical changes—are described in another section of the monograph. Certain experimental results of Kalischer, which are not compatible with the Helmholtz resonance theory, are not accepted by Waetzmänn as being not conclusive.

The value of the resonance theory is illustrated by numerous examples taken from physiological acoustics, such as *tone-color* (variably wide zones of stimulation of the basilar membrane, at different tone-levels); *sound-paralysis* (independence of sound sensation from the phase of the primary tones); *vibrations* (maximum number of vibrations in the high tone levels); the relations of music and sound (roughness, theory of consonance and dissonance, etc.); finally, the disturbances of hearing. These acoustic phenomena are all satisfactorily accounted for on the basis of unequally softened ear resonators.

The problem of the combination-tones takes up most of the fourth section of the monograph. In a comparison of Koenig's and Helmholtz's theories, the preference is unconditionally accorded the latter. Helmholtz assumed a disturbed superposition of the vibration of the primary tones, a dependence of the elastic forces on higher potencies of selection, therefore asymmetrical elasticity of the vibrating medium. He obtained, in the resulting type of vibration, pendular components corresponding to the vibration-figures of the combination-tones; but found himself still under the necessity of referring the point of origin of the combination-tones into the head. It is only recently that the theory of Koenig, which is incompatible with a resonance theory, has been successfully overcome through the demonstration of the objectivity of the combination-tones. According to Koenig's theory, the stimulation of a resonator through a differential tone produced by two primary tones would not be possible. However, Waetzmänn was enabled to show rhythmic twitchings on a lamella of glycerin-and-soap solution, covering the orifice of a resonator attuned to the differential tone $p-q$, when besides the primary tones p and q , a third tone was softly struck of the vibration figure $p-q \pm I$ (I here being a small figure). This suggests the appearance of vibrations, which, in their turn, prove that the differential $p-q$ is contained as a component in the resulting vibration of the lamella. Next in order follow a series of experimental investigations on the subject of combination—vibration—and intermittence tones.

The last section contains the mathematical supplement, such as the analysis of a vibration-curve with the assistance of Fourier's series; a discussion of the relations between the degree of softening and the

activity of the resonance; and a new attempt at derivation of the combination tones, which refrains from the assumption of asymmetrical elasticity.

Brieger, the author of the abstract of Waetzmänn's book, in the *International Centralblatt für Ohrenheilkunde*, No. 9, 1912, points out that notwithstanding the accurate formulation of the physical problems, the monograph, by virtue of its well-planned arrangement, is excellently well adapted to give the medical reader an insight into the matters of professional interest.

Whether one accepts or rejects the views of the author of such a monograph as that of Waetzmänn, it must be acknowledged that carefully prepared contributions of this character stimulate further investigation, and tend to develop the practical as well as to encourage the theoretical investigations of the scientific otologists.

It may be recalled by readers of the Otology section of PROGRESSIVE MEDICINE that the careful investigations of Shambaugh concerning the minute anatomy of the structures involved in tone perception were reviewed by me in 1908. It will be recalled by those who have followed his work that Shambaugh's conclusions, particularly with reference to the part played by the membrana tectoria in tone perception, are not in unison with the views of Helmholtz. His work represents such careful investigations, and his findings are so clearly stated, that I for one have been content to accept his views upon this subject.

Patenostre¹ has contributed to the question of labyrinthine function a study of the *functional tests of the labyrinth in aged individuals*. The results of these investigations may be summarized as follows,

The entire organ functionates less frequently in aged individuals between sixty and seventy years, than at the age of twenty years. The static part shows less difference than the acoustic part, for certain anatomical reasons. These findings were uniform in all of the author's examinations of the cochlear and vestibular apparatus. The hearing capacity may be said to diminish in old age by about three-fifths, as compared to youthful years. Concerning the vestibular apparatus, there is not much difference between young and old, as regards the test by clonic nystagmus through the use of cold water; but there exists a distinct diminution of the irritability, expressed by the more gradual onset of the nystagmus, its shorter duration, and slighter objective disturbances. Concerning the bone condition, the differences between old people and youthful adults are extremely well marked; they are referable to the changes of the skull bones occurring in advanced age, and their conductive capacity. In old age, the cochlear apparatus of one side has usually become entirely independent of that of the

¹ Functional Testing of the Labyrinth in Aged Individuals, *Annals des Maladies l'Oreille*, Tome xxxviii, 1912.

other through the bone structure. In youthful individuals this is not the case.

The cochlear apparatus was tested by means of the voice, the watch, and the tuning-fork; the air conduction with the watch and the voice (whispered and conversational speech); the bone conduction with the watch and the fork. While the average hearing distance for ordinary conversation is at 20 mm. in people aged about twenty years, the aged individuals rarely heard it better than at 13 mm. Women were always found to have better hearing than men; the left ear is almost invariably the best, in both men and women. Pregnancy had apparently never had an injurious effect upon the acoustic nerve. The majority of the aged persons possess a good hearing capacity for conversational speech. In regard to whispered speech, the distance of the hearing capacity is likewise diminished, being less than 4.5 mm. in one-third of the examined persons; between 4.5 and 6 mm. in one-third; and 6 mm. in another third. The above-mentioned differences between right and left, and between men and women, are still better marked. The acoustic apparatus, in all the individuals serving for these investigations, had always been normal and free from disease.

Various phases of the purely clinical study of the labyrinth have received attention during the year. In this category may be included 21 cases of secondary labyrinthine involvement, which have come under observation in the Schmiegelow clinic since 1908, reported by Heilskov.¹ This number included 11 fistulas of the labyrinth, 2 cases of circumscribed serous labyrinthitis; 4 cases of diffuse serous labyrinthitis, including 3 postoperative cases; 1 case of acute suppurative labyrinthitis, and 3 cases of chronic labyrinthitis, in middle ear tuberculosis. Among 4 postoperative cases, 2 were cured, and the patients were discharged with preserved or partially preserved acoustic static function. In one instance the affected ear became totally deaf, with destruction of the static apparatus. The fourth patient succumbed to a fulminating translabyrinthine meningitis. Labyrinthine symptoms appeared in one case as a sequel to the removal of ear polyps; a fistula of the semicircular canal was found to be present. There were 10 cases of cholesteatoma. With special reference to the site of rupture, a semicircular fistula was found in 14 cases, while in 3 cases the fistula was situated at the promontory. In 1 case with total loss of the stapes, the patient was completely deaf at the time of the discharge, but clonic nystagmus could be elicited by way of the affected ear. Endocranial complications appeared in only 2 cases.

The treatment was mostly conservative, the bone was opened, but not the labyrinth, unless pus was seen to escape from a fistula, or there was evidence of recent rapidly progressive destruction of the labyrinth.

¹ Secondary Involvement of the Labyrinth in the Course of Middle Ear Suppuration, *Ugeskrift for Laeger*, 1912, p. 499.

The conservative treatment employed in these cases is in line with the consensus of opinion among the most successful otologists of the present time. Personally, I feel more and more strongly, as my own experience is added to that of others, that the operative interference in acute cases must be based upon sufficient evidence of the beginning of localized meningitis. In acute cases where operation becomes imperative, the operative procedure recommended by Neumann is unquestionably indicated. This involves the radical removal of bone from the internal border of the sigmoid sinus up to the opening of the internal auditory meatus, including the semicircular canals, the vestibule, and the cochlea, leaving only a bridge of bone which supports the facial nerve. Any less radical operation than this fails to accomplish the purpose of surgical intervention in these acute cases. Inasmuch as the localized meningeal irritation has already begun, undoubtedly the bone operation should be supplemented by the incision of the dura over the area in which the localized meningitis has developed. This applies to acute cases. On the other hand, when the indications are present for operation in chronic latent suppurative labyrinthitis, it is just as important, in my opinion, that the operation of Neumann should not be undertaken as that it should be the method of choice in acute cases. In chronic cases the operation called for is simple drainage of the vestibule, the semicircular canal, and the cochlea. In my judgment, the explanation of the supposed indication for the radical procedure in chronic suppurative cases is to be found in the method employed, which actually defeats, in these cases, the purpose for which it is performed. In operating upon such dense, hard bone with hammer and chisel or burrs, which are the usual methods, the concussion is sufficient to break down the barriers between the meninges and the focus of suppuration. When it is realized that drainage is all that is necessary, provided these barriers are not broken down, it must be conceded, it seems to me, that some method is indicated which does not entail the danger of spreading the infection of the meninges. I have been able to accomplish this by means of hand gouges or curettes, proceeding slowly and patiently, instead of trying to work rapidly with the hammer and chisel and burr. The time consumed in this longer and more tedious operation conserves the interest of the patient.

In this connection it will not be amiss to quote again from Görke's valuable contribution to the literature of labyrinth disease, which I reviewed in *PROGRESSIVE MEDICINE* for 1912: "*Even the severer varieties of infection of the labyrinth, with the formation of pus in its spaces, may undergo natural cure in this way. Indeed, it cannot be too often repeated that not even in the severest forms of labyrinthitis are these healing processes absent; and, what is still more important, that in the majority of cases their protective action is effective.*"

In connection with what has been said, the case reported by Zia

Noury¹ of *chronic circumscribed labyrinthitis, complicated by serous meningitis*, is interesting. The anterior labyrinth, in a patient aged twenty-three years, had remained intact, as shown by the operation, and the posterior labyrinth had been invaded very gradually, the destruction affecting only the external canal and its surroundings. Labyrinthine irritation was clearly indicated by spontaneous nystagmus toward the diseased side, as well as the other signs. The very limited destruction of the external semicircular canal which was discovered led the operator to restrict the first interference to the evacuation of the tympanic cavity. In a second intervention, the external semicircular canal was opened, and the granulations were scraped from its interior and from the vestibule. A portion of the Fallopian canal was also curetted, as it appeared to be necrotic. Lumbar puncture yielded over 20 c.c. of a transparent spinal fluid, under a high pressure. Recovery resulted after this limited trephining operation, assisted by the lumbar puncture. The outcome was very satisfactory, and the cochlear function such that the patient heard whispered conversation at a distance of 0.50 mm.

A number of other phases of labyrinthine affection, some of which involve the necessity of coöperation between the specialist and the general practitioner, have received attention during the year. Some of these are reviewed without comment.

Grünberg² discusses the *inflammatory affections of the membranes of the labyrinth windows*, and their bearing upon the genesis of infection of the labyrinth. His conclusions are based upon the examination of the temporal bones of a child, aged ten years, who had died from scarlet fever. From the pathologico-anatomical point of view, the case was one of scarlatina leading to death through septic pyemia, with bilateral middle ear suppuration, which had led to extensive necrosis of the soft parts in the middle ear spaces, under local involvement of the bone. The microscopic findings suggested that the acute process had not attacked an entirely intact middle ear (connective tissue thickening of the mucosa, and especially new formation of the connective tissue in the niche of the round window of the right side). On both sides the middle ear inflammation had invaded the labyrinth, through the soft parts of the window closures, the annular ligament, and the secondary tympanic membrane. On the right side there was a very recent, chiefly serous, labyrinthitis, and on the left an advanced purulent inflammation of the labyrinth.

Undoubtedly the labyrinth infection had occurred on both sides through the labyrinth windows, in each instance through the oval as

¹ Sur un cas de labyrinthite chronique avec meningite serreuse, *Archives Internation. de Laryngol., d'Otol. et de Rhinol.*, Tome xxxiv, 1912, p. 83.

² Beitrag zur Kenntniss der entzündlichen Erkrankungen der Labyrinthfenster-Membranen und ihrer Bedeutung für die Genese der Labyrinthinfektion, *Zeitschrift für Ohrenheilkunde*, 1911-12, lxiv, 155.

well as the round window. No gross lesions of continuity, or rupture, could be demonstrated anywhere. The condition essentially concerned a necrosis of the soft parts, which affected the tissue in its entire thickness, including the external and internal, epithelial and endothelial lining, respectively. Histologically, this was expressed through a blurred structure and absence of nuclear staining. It is noteworthy that the continuity of the outermost and innermost layers of the ligament, which are rich in elastic fibers, was more or less preserved. The absence of a solution in continuity, in spite of the grave vital damage of the tissue, is due to the power of resistance of the elastica. Furthermore, the author's findings serve to illustrate the part of the *bacteria* in the occurrence of the necrotic changes in the soft parts of the windows. Masses of staphylococci and streptococci were found in the partly purulent exudate, consisting of masses of detritus; the middle-ear spaces presented an extensive purulent necrotic inflammation. No bacteria could be demonstrated in the interior of the labyrinth.

The cause and origin of subjective ear noises are discussed by Mayer,¹ who holds that from the analysis of the histological investigations of the past, affections of the peripheral neuron of the acoustic nerve are concerned in the majority of the noise-producing diseases of the internal ear. It is not known, however, how this disease differs histologically from nervous deafness without subjective noises. The author claims that the changes in the spinal ganglion, found by Neumann as the cause of the subjective noises, and described by this observer as "primary and secondary neuronophlagia," will not withstand a strict criticism. Upon the grounds of available reports, and the study of his own material, Mayer objects to the admittance of the conception of neuronophlagia into the domain of otology. A case of leukemia is cited in which he was enabled to carry out accurate hearing tests during the lifetime of the patient. Upon the basis of the detailed history of the hearing tests, as well as the histological findings, he argues most plausibly that the subjective noises in this instance originated through the auscultation of entotic or periodical noises.

Stütz² contributes the observation of a case of isolated *degeneration of the cochlear nerve*, in a woman, aged sixty-four years, whose illness began under the clinical picture of severe anemia. In the course of the disease, the patient developed moderate hardness of hearing on the right ear, and sudden considerable impairment of hearing on the left ear. Histological examination of the temporal bones served to show that the auditory disturbances were due to a degenerative process,

¹ Ein Beitrag zur Kenntniss der Entstehung der Ohrengeräusche, Monatsschrift für Ohrenheilkunde, 1912, No. 2.

² Beiträge zur Kenntniss der isolirten Cochlearis-degeneration (degenerativen Neuritis), Zeitschrift für Ohrenheilkunde, 1912, lxx, Heft 2 and 3.

limited to the *cochlear neuron*. Arteriosclerosis and anemia had to be assumed as etiological factors.

The differential diagnosis of labyrinth disease and affections of the acoustic nerve, the cochlear and vestibular branch of the acoustic nerve, the etiology and treatment of neuritis of the eighth nerve, are discussed by Lang,¹ who passes in review the entire corresponding literature of the last few years. In conclusion he refers to hysterical anesthesia and simulation, as well as their bearing upon the differential diagnosis.

Buy² describes and explains a variety of symptoms occurring in individuals with labyrinthine disturbances, or even in healthy persons after exposure to certain conditions which are capable of momentarily altering the static functions of the internal ear. Besides nystagmus, the author discusses the deviation as a whole, the general movements of the body, the cerebellar sign of Barany, pointing out the importance which these signs may acquire for the physiologist as well as the clinician.

Aural Vertigo. Continued efforts in the study of the physiology of *static equilibration* or *orientation* have not sufficed to finally settle the many points involved. Investigations of this kind, however, are important, and each contribution, however theoretical it may appear, adds so much to the gradual evolution of the subject and to the eventual discovery of the whole truth. It may be many years, and certainly much work remains to be done, before a settled conviction is reached.

Investigations such as Livi³ has made concerning galvanic *vertigo* in pigeons adds to the experimental phase of the subject, and is of interest from that point of view. His studies were made after unilateral or bilateral extirpation of the labyrinth. Healthy pigeons showed, on weak currents, slight movements of the head, which on stronger currents appear in four forms: inclination of the head; nystagmus of head; rotations of the head; nystagmus of head and eyes. All these movements are stronger on closing than on opening the current. In the former, they are directed toward the anode; in the latter, toward the kathode. Under a progressive increase in intensity of the current, their sequence is constantly as follows: inclination of the head on closure of the current; nystagmus on closure of current; inclination of the head on opening of current; nystagmus on opening of current; rotation on closure of current; rotation on opening of current. The following observations were made on animals which had been operated upon:

¹ Neuritis nervi acustici, Casopis lekern ceskych., 1912, No. 22-25; Abstract, Internation. Centralblatt f. Ohrenheilkunde, 1912, x, 429.

² Réactions Vestibulaires, Journal de Médecine de Bruxelles, 1912, No. 6.

³ Galvanic Vertigo, Bollettino delle Science Mediche, Fasc. 6, 1912.

1. Susceptibility to galvanization through and across the head increases immediately after the operation and for a few days afterward, then remaining constant.

2. The sequence of the individual movements is modified, in a constant fashion, in such a way that greater strength of current is required, in closing as well as opening of the current, for the production of nystagmus than for the production of rotatory movements of the head.

3. The movements of the head and the eyes remain unchanged as to their forms, and are always directed toward the positive pole on closing of the current, and toward the negative pole on opening of the current.

The author points out the identity of the spontaneous rotation of the unilateral extirpation of the semicircular canals, with the rotatory movements produced through galvanization. In his opinion, the nystagmus of the head and eyes originates in the semicircular canals, but in the absence of these it may be produced through stimulation of the corresponding nerve centres. Movements of rotation and inclination of the head have their origin in the utriculus and sacculus. Unilateral lesion of the semicircular canals have a bilateral effect in regard to the above-described phenomena.

All types of vertigo which occur in non-suppurative cases, particularly in the otosclerotic and in patients who have general arteriosclerosis, and which are still thought by some otologists to be due to "indigestion," or one or more of many allied causes, are, in my opinion, plainly of vestibular origin. The connecting links between the cause and effect remain, however, to be demonstrated by experimental and clinical investigations, in which the internist and the otologist must coöperate.

At the 1912 meeting of the American Laryngological, Rhinological, and Otological Society, several papers were read which called an expression of opinion concerning the importance of the correlation of the various special branches of medicine, the interdependence of all, and the increasing obligation imposed upon the specialist of extending his field of observation to the territory formerly usurped by the "general practitioner." The counter-suggestion may be implied, of the obligation on the part of practitioners in any given field, particularly internal medicine, of being able to refer obscure cases to the proper specialist.

In this connection the contribution of Daniel McKenzie,¹ "A Case in which the Cure of Constipation Induced the Disappearance of Aural Vertigo (Ménière's Syndrome)," is of interest. On a previous occasion McKenzie presented (before the Otological Section, Royal Society of Medicine) a case in which severe aural vertigo of the Ménière type underwent benefit as a result of vegetarianism and iodide of potash.

¹ Journal of Laryngology, Rhinology, and Otology, January, 1912.

After six months' treatment the attacks entirely ceased, the patient returning to work.

In the present case, the patient, a man, aged thirty years, complained of tinnitus in the left ear. The hearing tests showed signs of slight nerve-deafness. Vestibular tests were as follows: Right ear, nystagmus in thirty seconds; rather small movements; no vertigo. Left ear, nystagmus in twenty-five seconds, vertigo.

Nothing was found in the nervous system or in the middle ear to explain the nerve deafness. The further history of the patient, however, revealed the following interesting facts: Nine years ago he began to suffer from recurrent attacks of vertigo and vomiting, the intervals gradually decreasing in length from eighteen months to six and less. The attacks were initiated with tinnitus in the left ear, which was followed in about half an hour by deafness in the same ear, and vertigo sufficiently violent to necessitate his lying down. Nausea and vomiting followed, and then the entire disappearance of the attack. There was no loss of consciousness. After recurrent attacks of this character during a period of seven years, there was no return of symptoms. The disappearance of the attacks was coincidental with the cure of chronic constipation, the means employed being appropriate dieting, and the primary object being the cure of the constipation in order to check the periodical hemorrhage from hemorrhoids. No relation, according to the history, existed between the vertiginous attacks and the hemorrhage. The tinnitus persisted.

One may assume, with regard to the pathogenesis of this train of aural symptoms, the influence of a gastro-intestinal toxin acting upon the nerve endings within the labyrinth or upon the nerve centres, with the weight of evidence (the appearance of persistent tinnitus with nerve deafness) in favor of the labyrinth rather than the central nervous system.

Such cases, it is thought, show what popularly pass for "bilious attacks" may be the occurrence of the "labyrinth storm" known as "Ménière's syndrome."

Syphilis of the Ear and its Treatment with Salvarsan. Inasmuch as syphilis produces more vertiginous attacks than any other cause, this disease, in its relation to the ear, has continued to engross the attention of otologists. This naturally involves the use of salvarsan, and the question of the probably injurious effects of this agent upon the acoustic apparatus. It is manifestly impossible to review all the conflicting testimony on this subject. Two contributions, *pro* and *con*, have marked the literature of the year.

Citelli¹ voices the opinion of a number of otologists concerning

¹ Le Neuro-Labirintiti nei Luetici e il Salvarsan, Archiv Italian di Otologia, 1912, xiii, No. 4. Also Ninth International Otological Congress, Boston, August, 1912, p. 241.

neuro labyrinthitis following the use of salvarsan. He points out that many cases of neuro labyrinthitis, after salvarsan, are not referable to an effect of this remedy, but represent specific syphilitic changes, which require the immediate repetition of the salvarsan medication. It is possible that in a few especially predisposed patients, the arsenobenzol may injure a still healthy acoustic nerve; but the majority of the cases of neuro labyrinthitis, in luetic individuals, are of syphilitic character. The syphilitic lesions of the acoustic nerve, far from representing a contra-indication against the use of salvarsan, are promptly cured, or greatly relieved, by this remedy, which in a general way gives therapeutic results greatly superior to those of any other known remedy. However, it is advisable, in all cases, to follow "606" with mercury and iodide treatment. In order to test the tolerance of the patient to "606," an injection of 15 to 20 centigrams of salvarsan may first be applied, and the rest up to 60 centigrams a week or so later. This method will contribute to the peace of mind of both physician and patient, especially while there prevails such a diversity of opinion concerning "606."

In 4 cases of neuro labyrinthitis, after recent infection with syphilis, prompt improvement was observed by Citelli to follow upon the administration of salvarsan, after all other specific methods of treatment had failed. The author preferred in his cases the intramuscular to the intravenous injection of salvarsan. Although the intravenous method was especially recommended by Ehrlich and by Benario, many cases reported by Mucha showed the effect of intravenous injections to have remained inferior to that of gluteal injection. Furthermore, in spite of the most careful technique, the intravenous injections of "606" may give rise to complications, including a fatal outcome, which are absent after muscular injections. Citelli considers the intramuscular injection as distinctly preferable to the intravenous injection of "606." The consensus of opinion, in which I share, seems to be against the practice, which Citelli advises, of giving salvarsan by intramuscular rather than by intravenous injection.

Concerning the diagnostic and prognostic value of the Wassermann test, Citelli regards this as very relative and limited. The Wassermann test may be negative when the syphilitic infection is still fairly active, or positive, in diseases of another character, when the lues is practically cured, clinically.

Citelli's 4 cases were referable to a genital infection, and the neuritic lesion occurred in the absence of the severe headaches and papulous syphiloderma which Benario credits with importance as forerunners of the nervous specific recurrences in these cases.

The alarm-cry which has been raised against "606" by many authors, in regard to neuro labyrinthitis and neuritis of other cranial nerves, may have very harmful practical results, insofar as physicians in many

cases will refuse the responsibility incurred by the use of "606." It is certainly pessimistic and unwarranted to attribute to "606" all, or nearly all the lesions of the acoustic nerve developing after its use. Numerous cases are promptly improved, or cured, by a repeated injection of salvarsan. In the ear, which is so often the seat of pathological processes, periostitic swellings are apt to be present, offering resistance to the entrance of any remedial agent. The surviving spirochetes furnish the cause of the nervous relapses, which become manifest as clinical symptoms only by virtue of their seat. It is probable that at least in the majority of cases of lesion of the acoustic nerve, reported after the use of salvarsan, this complication was not caused or favored by "606," but was referable to the syphilis itself, representing the "Neuro recidiv," or nervous relapse, described by Ehrlich, and amenable to further medication with salvarsan.

For the reasons stated in my review of the subject in *PROGRESSIVE MEDICINE*, 1912, I still feel with Citelli, that the neuro-recurrences which apparently follow the use of salvarsan are due to remaining spirochetes rather than to the toxic effects of the drug. It is significant that so many cases of neuritis are being reported, the affection usually appearing within three months after the exhibition of salvarsan. The important feature of the treatment seems to be the giving of a sufficient dose at the outset to completely sterilize the blood, rather than to attempt to accomplish this by repeated doses. In some way the exhibition of arsenical preparations in small doses seems to confer an immunity upon the organisms not killed against subsequent doses. This point has been very well brought out by Ehrlich and Bertheim, as mentioned in *PROGRESSIVE MEDICINE* for March, 1912, p. 331.

Gellé¹ voices the opinion opposed to that of Citelli and those who, like myself, agree with him, concerning the neuro-recurrences following the use of salvarsan. On the basis of his personal observations, Gellé arrives at the conclusion that in the present state of our knowledge, he would resort primarily to mercury or potassium iodide, instead of salvarsan, when called upon to treat a *syphilitic ear lesion*. Nervous disturbances are very common after salvarsan medication, especially paralysis of the acoustic nerve, alone or combined with paralysis of other cranial nerves. A number of syphilographers assume that these complications are due—through a mechanism not quite clear to the writer—to the toxic action of the imperfectly destroyed trypanosomes; under these circumstances, it is rational to continue the salvarsan. On the other hand, if a toxic effect of the salvarsan itself is responsible, its employment should not be resumed in these cases. Although it is usually claimed that this kind of deafness is recovered from, the author was unable to note a cure in any of his three cases. The dose

¹ Nerf acoustique et Salvarsan, *Revue Hebdom. de Laryngol. d'Otol. et de Rhinol.*, 1912, No. 42, p. 499.

of the "606" apparently has no influence, as the complication was observed to follow after small repeated doses (0.6 centigrams).

Otosclerosis. Despite the very definite anatomical work of Siebenmann, Brühl, Gebhardt, Manasse, and a number of other investigators, who have had the opportunity of making careful microscopic studies of the temporal bones of subjects upon whom they had been able to make a series of functional tests extending over a series of years, one occasionally encounters articles on *otosclerosis* which set forth more or less fantastic theories concerning the etiology and treatment of this puzzling condition. The writers of these papers, one is constrained to believe, have no grasp of the situation, but are still looking upon all cases of non-suppurative deafness as being in the same class.

The recent contribution of Raoult¹ to the subject of otosclerosis comes within the above category.

In discussing the pathological physiology of *otosclerosis*, Raoult points out that otosclerosis must be considered as the outcome, or terminal stage, of all chronic affections of the ear. Patients pass through these stages before developing actual sclerosis of the ear. The lesions of the presclerotic stage begin in some organ of the ear, which disturbs the equilibrium of the ear, and results in hardness of hearing, tinnitus, vertigo, and general sensory disturbances. This is the stage of functional impairment, but in consequence of this failure of the ear, its other organs are promptly involved, and the sclerosis becomes progressively established. The author believes that in the majority of cases the initial lesion is a neuritis which produces an incapacity of the muscles of the middle ear. The circulation in the ear ceases to be normal, due to the immobilization of the transmitting apparatus. Later on, trophic disturbances, tissue-degenerations, bony lesions, and so forth, make their appearance. These neurites are the sequelæ of general affections (intoxication, pregnancy, exhaustion). They may concern the sensory and the trophic nerves, the motor branches, and the terminations of the acoustic nerve. The sensory and trophic neurites explain the ischemia of the organs of the ear, the loss of muscular function, and the trophic lesions. The motor neurites immobilize the transmitting apparatus, leading to ankylosis and trophic disturbances. Next, sclerosis is established. The explanations render the possibility of improving the hearing by kinesthetic treatment, as the author was enabled to observe, with the employment of the Zünd-Bourgeret apparatus. The importance of muscular and vascular lesions also explains the continuation of the improvement even after the treatment is concluded. The improvement in the opinion of Raoult, depends, therefore, upon the condition of the muscular fibers.

¹ Aperçus sur la physiologie pathologique de la sclérose otique, Société Française de Laryngol. d'Otol. et de Rhinol., Mai, 1912; Archives Internat. de Laryngol., d'Otol. et de Rhinol., 1912, xxxiii, 1067.

The failure, as it seems to me, to grasp the true significance of otosclerosis is even more marked in the writings of Heath,¹ particularly as evidenced in his recent pamphlet on paracusis Willisii and other subjects. Phenomena which would be attributed by the average careful observer to otosclerotic changes, are considered by him to be due to flaccidity of the "membrane of the oval window." "Paracutic deafness," as he terms the chief of these phenomena, is treated by Heath by the unique method of painting the membrana tympani with cantharidin in graduated solutions (blistering, in other words), the idea being to induce inflammation of the membrane and consequent swelling and stiffening of the mischief-making "membrane of the oval window." Inasmuch as only 9 cases are reported as having been treated by this method, and these are given in a rather "flaccid" style, it would be wasting time to even mention work of this character but for the fact that immature practitioners and students of otology may be led thereby to follow after false gods.

Fortunately, the views of otosclerosis which seem, at least to me, to be misconceptions, and the methods of treatment which are suggested as the outcome of these erroneous theories, are offset by much serious scientific work, as evidenced in the literature of the subject.

Gradenigo² discusses the various theories of *otosclerosis* and points out the significance which attaches to tuberculous infection, insofar as it prepares the soil for the development of otosclerosis. Attention is also called to the influence which acute and subacute inflammatory processes may exert upon the progress of incipient otosclerosis.

Arteriosclerotic changes of the vessels which supply the ear, may, in the opinion of Stein,³ show undesirable results also in form of painful or unpleasant sensations in the auditory organ. These disturbances are referred by him to changes of the local circulation, such as an interrupted or diminished blood supply of the sensory nervous areas of the ear. The term "angiosclerotic otalgia" is proposed by him as descriptive of the condition. The diagnosis should not be rendered, however, unless the patient is arteriosclerotic, and all the other etiological factors of otalgia are missing.

Theobromine, or diuretine, permit the establishment of the diagnosis, and at the same time are serviceable for the treatment of these conditions, by virtue of their vasodilatory properties. (Dose, 0.5 three to five times daily.)

In his recent valuable contribution to the literature of otosclerosis,

¹ The Nature and Causes of Catarrhal "Throat" or Hereditary Deafness. An Explanation of Paracusis Willisii, etc., Jour. of Laryngol., Rhinol., and Otology, September, 1912, p. 518.

² Otosclerosis and its Relation to Tuberculosis, Archivio Italiano di Otologia, 1912, No. 4.

³ Angiosclerotic Otalgia, Wiener klin. Woch., 1912, No. 26, p. 1002.

Manasse¹ gives a brief final glance at the etiology of the condition, pointing out the extremely great probability of the entire affection being due to some general or constitutional factor, as indicated by the composition of the disease, of a change in the bone and a change in the soft parts, the very peculiar symmetry of the bone change and the heredity of the disease.

Upon the basis of a number of case-protocols (10), Manasse takes up, in the first place, the *anatomical* picture of *chronic metaplastic otitis of the human labyrinth capsule*, better known as *otosclerosis*, and then enters briefly into the *clinical* aspect of the disease, chiefly with the aim of investigating the relation between the anatomical findings and the observations on the clinical material. The anatomical studies include the changes of the bone and of the *membranous labyrinth*. Concerning the former the author arrives at the following conclusions: (1) During the principal period of the disease the new formation of bone is undoubtedly the active factor, and therefore presumably primary, while the disintegration is certainly brought about only secondarily, through the advancing mass of newly developed bone. (2) It has been demonstrated that the first beginning of the disease can likewise consist primarily in new formation of bone. (3) The breaking down of the old labyrinth bone does not, as a rule, take place through lacunar absorption, but in consequence of simple displacement through the newly developed bone. An associated disintegration of the old labyrinth bone through Howship's lacunæ and osteoclasts, at the beginning, as well as in the advance of the pathological process, has never been demonstrated, although it cannot be altogether denied.

Regarding the *character* of the pathological process (which consists in the disappearance of the old bone and its substitution by new bone), the conclusions drawn from the author's histological examinations may be summarized as follows:

The alteration of the labyrinth capsule begins with the formation of osteoid and granulation tissue, within the performed vascular spaces. The old bone is destroyed in consequence of this process, through simple substitution (not by lacunar absorption), and its place is taken by new bone tissue. The latter has only an intermediate character, insofar as it is again destroyed through two different kinds of disintegration; first, by sieve-like perforation of the newly developed bone; second, by lacunar absorption, with formation of osteoclasts. Next, bone is again formed (at first, spongy bone) by way of the resulting marrow spaces, through the activity of osteoblasts, and this bone does not disappear again. It becomes thicker and firmer, and the cellular marrow is changed into fibrous, fatty, or gelatinous marrow;

¹ Die Otitis metaplastica der menschlichen Labyrinthkapsel (Otosklerose, Stapesankylose, Spongiosierung der Labyrinthkapsel), Die Ohrenheilkunde der Gegenwart, Koerner, 1912.

the marrow spaces become progressively smaller, the bone lamellæ are arranged more and more closely, developing systems of lamellæ, and ultimately again come to represent compact bone, which is always sharply contrasted from the old labyrinth bone, however. Portions of the first young bone are perhaps transformed directly into solid bone tissue, without decomposition and re-apposition. The change into solid bone constitutes the terminal stage of the entire process.

Manasse is of the opinion that the condition should be interpreted as an *inflammatory* process. Its beginning with the formation of granulation tissue and osteoid tissue; the alternation between apposition, absorption, and repeated apposition; the formation of giant-cells; all these processes are found in a similar fashion in the chronic inflammatory affections of the bones, for example, in *ostitis chronica fibrosa*. In addition, there is the transformation of the cellular marrow into fibrous marrow, the final production of solid compact bone, the formation of exostoses, and all of these being the signs of a productive process which must be ranked parallel with the chronic inflammations of other organs. Manasse, accordingly proposes the name of "*chronic otitis*," for the entire pathological process in the bone, qualifying it as "*metaplastic*," because the transformation of the old labyrinth capsule is characteristic of this inflammatory process. The entire affection, therefore, is designated by him as *ostitis chronica metaplastica* of the labyrinth capsule.

With special reference to the *localization* of the bone disease, the examination of seventeen petrous bones, derived from 10 patients, showed that this disease is not a specific affection of the stapedio-vestibular articulation, but of the labyrinth capsule. The involvement of the stapes as well as its articular connections is merely the result of the stapes being inserted at the labyrinth capsule, forming a part of the latter, as it were. In the majority of the cases the pathological foci are found at the so-called seat of predilection, the anterior portion of the oval window; although they may occur irregularly, in all places of the labyrinth capsule. In the author's specimens, the arrangement of the foci was remarkably symmetrical.

Manasse's personal findings, and the description as well as interpretation of the histological picture, are compared by him with the most important contributions to the subject contained in the literature, with the comment that the majority of workers do not enter into sufficient detail.

Regarding the changes in the membranous labyrinth, it is certain that atrophic degenerative changes are very common in the cases of chronic otitis metaplastica of the labyrinth capsule. The author's specimens all presented the signs of a degenerative atrophy in the nervous elements, *i. e.*, atrophic changes of Corti's organ; atrophy, and new formation of connective tissue at the fine nerve terminals in the

cochlea; similar findings at the spiral ganglion; sometimes, changes at the trunk of the eighth nerve. Exactly as in the cases of pure labyrinthine hardness of hearing, these changes were not always present at the same time in the above-named places, but they were never entirely absent in the membranous labyrinth. The author is convinced that the same changes are invariably encountered in any severe hardness of hearing or deafness of chronic onset, no matter of what etiology.

As to a dependence or causative connection between the two anatomical findings in the bony and the membranous labyrinth, the author has not yet become convinced that the two changes are dependent upon each other in all cases. It seems hardly probable that the very small solitary foci in the labyrinth capsule can exert a notable influence upon the labyrinth and the eighth nerve. The association of the two changes is perhaps absolutely non-indicative of a causative relation.

The author points out that stapes ankylosis may also occur through other anatomical changes than in consequence of chronic otitis of the labyrinth capsule.

Clinically, the typical symptoms of middle-ear deafness are to be expected in *otitis chronica metaplastica* with stapes ankylosis, provided it is uncomplicated. On the one hand, however, anatomical complications are apt to be present which interfere with the purity of these symptoms, and on the other hand, these symptoms may point only to stapes ankylosis, instead of *otitis metaplastica* of the labyrinth capsule. The common affection of the membranous labyrinth in these cases must necessarily present more or less distinct clinical signs of an obstacle to sound perception, according to its extent; so that in the majority of the cases the exclusive signs of middle-ear deafness are not to be expected, even if the bone disease is limited to the stapedio-vestibular articulation. From purely theoretical considerations, *i. e.*, the outcome of the anatomical examination, no uniform hearing-test findings are to be anticipated. The examination of the actual conditions entirely bears this out, the outcome of the hearing tests in these cases varying from pure obstacles of sound-sensation to mixed findings, with very isolated cases of pure obstruction to sound conduction. It is not possible to formulate a clinical picture which corresponds to the anatomical findings in this affection. The facts that (1) the anatomical lesion consists of the two entirely different affections of the bony and the membranous labyrinth, and (2) that the bone disease is localized in the most diverse positions, preclude the establishment of a uniform clinical picture, corresponding to the changes, which differ both as to quality and quantity.

In view of these anatomical studies of Manasse, of the demonstra-

tion by Siebenmann¹ at the Ninth International Otological Congress in Boston, and of other similar work, one feels no necessity for following the various etiological will-o'-the-wisps which from time to time flash across the otologic horizon.

Jugular-bulb Thrombosis. *Thrombophlebitis* of the bulb of the internal jugular vein acquires practical interest, as pointed out by Rouget,² by the frequency of this complication, its symptomatology, the difficulty of accurate diagnosis, and especially the results accomplished in the very recent past through operative interference. The frequency of the affection is due to the anatomical arrangement, the bulb being the regulator between the extra- and the intra-cranial circulation, which favors congestion and the development of germs. Although the condition may exist alone, it is most commonly associated with thrombophlebitis of the surroundings. The disturbance may be primary, through transportation of pathogenic factors by the vascular route, or an infection propagated through the more or less thick floor of the tympanum. It may also be secondary, through progressive involvement of the sinuses. The symptomatology does not readily permit the distinction from thrombosis of the lateral sinus and the internal jugular vein: hidden onset in the course of otorrhea; chills, with or without perspiration and vomiting; temperature of 40° C. and over, rapidly dropping to normal or below normal; several attacks in twenty-four hours. There are headache, prostration, anorexia, constipation replaced by diarrhea at the onset of pyemia, a rapid pulse, accelerated respiration, fetid breath; locally, redness, edema, sometimes pain at the upper portion of the jugular. Limitation of movements, especially of rotation; sometimes pain on swallowing; paralysis of palate, velum, and vocal cords. Metastatic affections are common.

The diagnosis can only be rendered on the operating table, in the following cases: (1) After incision of the sigmoid sinus, and removal of the thrombus, there is absence of blood or escape of pus. (2) After the ligature of the jugular above the thyrolinguofacial trunk, the upper end of the vein is found to be empty.

The author proceeds to a discussion of the various methods of treatment which have been proposed, more particularly the atloido-occipital method of Lombard. All are based on the principle of obstructing the access of infective agents from above by exposure of the sinus and tamponing it below, with ligature of the internal jugular vein before the sinus is opened; thus preventing the distribution of microbes, or emboli; and the entrance of air into the veins. This is followed by the intervention of the bulb itself. There are two forms of interference:

¹ Otospongiosis Progressiva, Papers Ninth International Otological Congress, Boston, August 12 to 17, 1912.

² Des thrombophlébites du golfe de la jugulaire interne. Leur traitement: Procédé Atloido-Occipital, Annales des Malades de l'Oreille, du Larynx, etc., 1912, Tome xxxviii, p. 101.

1. Interventions without opening the bulb: (a) Lavage, or irrigation; (b) drainage; (c) curetting; (d) tamponing.

These incomplete measures may lead to cure provided the disease is not very pronounced.

2. Interventions accompanied by incision of the bulb: (a) Trans-tympanic route (Piffi); (b) transmastoid route (Grunert); (c) atloido-occipital route (Lombard).

The latter procedure gives a better access than the others, according to Rouget, with less danger of injuring the eighth nerve. It includes the ligation of the jugular vein, the evacuation of the petromastoid space, the exposure of the antrum and the sinus. The operative dangers consist in the injuries of the facial nerve, which is rarely cut, but often exposed to traction; lesions of the twelfth cranial or first cervical nerve; wounds of the carotid artery; formation of encephalocele; injury of the vertebral artery. Harmful sequelæ may consist in hyperemia of the brain, meningeal or parenchymatous hemorrhage, circulatory cerebral disturbances, and anomalies of the ocular fundus.

All procedures yield bad results from the cosmetic point of view. From the therapeutic standpoint the operation by the atloido-occipital route is rational, because it attacks the focus itself, and it is necessary when metastases follow upon the incision of the sinus and jugular ligation. The exposure of the bulb may be performed in the same session as the disinfection of the sinus and the ligation of the jugular vein, or secondarily. Operation at the first session is indicated when the lesions are continued as far as the bulb. In the cases of isolated phlebitis, the diagnosis is too uncertain; moreover, numerous phlebitis of the bulb are cured after incision of the sigmoid sinus and jugular ligation. The bulb is operated upon secondarily, when the septicemic symptoms continue to develop after the operation. The guiding rules of the operator confronted with a thrombophlebitis of the bulb of the internal jugular are the radical disinfection of the focus, and the prevention of the access of infectious agents. Although a very tedious operation, on account of the depth at which the work is done, and the many organs which must be managed, the opening of the bulb is the only procedure which permits the exclusion of the dangerous vascular area from the circulation, and the only one which can yield a result, provided that the deep sinuses, more particularly the petrous sinus, are not yet thrombotic. Accordingly, the operation upon the bulb is a radical procedure.

McKernon,¹ who first called attention to the frequency of primary jugular bulb thrombosis in children, has obtained results from operative interference which have not been excelled, or perhaps equalled,

¹ Primary Jugular Bulb Thrombosis in Children, as a Complication of Acute Purulent Otitis Media; with a Report of Cases. *New York Medical Journal and Philadelphia Medical Journal*, July 1 and 8, 1905.

by others, yet he has not advocated the radical procedure suggested by Mouget. In view of McKernon's reported successes it is questionable if such radical procedure is necessary. It seems to me very probable that the petrossal veins become blocked off by benign clot to the first branch following the formation of septic clot in the bulb. It is not the local sepsis which causes death in these cases, but the fact that the local area is constantly washed by a large stream of blood flowing into the general circulation. The removal of all the clot, and the establishment of efficient drainage are not so important, in my opinion, as cutting off the blood stream on both sides of the area of infection. The operation which accomplishes this most quickly, with least shock to the patient, and with least probability of injury to the facial nerve, would seem the best procedure.

Neoplasms, Benign and Malignant. MALIGNANT NEOPLASMS involving the external auditory meatus and middle ear, and either primarily or secondarily affecting the internal ear, have received considerable attention in otological literature during the past year. The world-wide campaign being so vigorously waged against cancer in all its forms has doubtless led otologists, as well as general practitioners and general surgeons, to be on the alert for neoplasms of whatever kind. Growths affecting the auricle come no more within the province of the otologist than of the general surgeon; records of such cases, therefore, are more apt to be found in general surgical literature than in that which concerns the field of otology. When, however, the growth invades the external auditory meatus primarily, or secondarily from the auricle or other superficial structures, the domain of the otologist is reached.

A number of cases of benign and malignant neoplasms of the external meatus and middle ear, as well as the deeper structures involved in the mechanism of hearing, have been reported within the past year, some of which are enumerated.

AURAL POLYPI have been made the subject of study by Citelli,¹ whose observations on the pathological and clinical significance of so-called *ear polyps*, and on the etiology of tumors of benign character; on the basis of 8 interesting cases of ear polyps, lead him to the following conclusions:

1. The ordinary polyps of the ear can be divided into two groups, the *granulomas* and the *neoplastic polyps* (fibromas, myxomas, mixed forms). The former are usually of a red color, and have a granular surface; they consist almost entirely of granulation tissue, and indicate a diffuse severe lesion of the auricular walls. The neoplastic polyps, on the other hand, are mostly of a whitish or transparent grayish color,

¹ Sul significato patologico e clinico dei cosiddette polipi-auricolari e sulla etio-genesi dei tumori benigni in genere (a proposito di otto casi interessanti di polipi dell'orecchio), Papers, Ninth International Otological Congress, Boston, August, 1912, p. 225.

have for the better part the structure of true fibromas, fibro-angiomas, or myxomas, and have, as a rule, a more favorable prognosis, through the complete cure of the surgical lesion. Neoplastic polyps are much less common than granulomas.

2. The polyps of the first as well as of the second group—in contradiction of the views of Brühl—are nearly always secondary results of a manifest or latent inflammation, and have a tendency to pass into each other. In the structure of various segments of the same tumor may be seen transition stages from the inflammatory type of new formation (granulomas) to the neoplastic type. For this reason it often remains doubtful if an auricular polyp should be considered as an inflammatory or neoplastic product.

3. Ear polyps as well as nasal polyps, which are well adapted for the study of the pathogenesis of benign tumors, suggest a histogenic pathogenesis of the same under the action of various inflammatory agents, upon specially predisposed tissues and individuals.

4. The inflammatory and histogenic pathogenesis of benign tumors, besides being in conformity with century-old views concerning the influence of irritative factors on the origin of tumors, confirms the histogenic pathogenesis of malignant tumors as well, and is plausible as tending to the establishment of an identical pathogenesis for all tumors.

5. Contrary to the suggestion of Politzer, the epithelial lining of these auricular tumors possesses practically no value for the determination of their starting point from the meatus or the tympanum, for in the eight tumors studied by Citelli, although all originated from the tympanum, the epithelium was of the flattened stratified type, instead of cylindrical.

In recent years it has been the opinion of otologists with whom I have discussed the subject—an opinion which I share—that the presence of granulation tissue in connection with chronic otorrhea is sufficient indication for radical operation. It has been my practice, therefore, to avoid any interference with such a case until it had been prepared for the radical operation, so that the entire operation may be completed at one séance. This opinion has been arrived at because of the fact that interference with polypi and granulation masses in the tympanic cavity has, in some instances, precipitated acute labyrinthitis or localized meningitis.

If Citelli's contribution to this subject leads to the ability to differentiate one kind of polyp from another, so that it may be determined which kind may be treated by simple removal while another calls for more radical surgical intervention, it may be well to look further into the subject of aural polypi and their treatment.

Of interest in this connection is the paper by Pusateri,¹ who, in his

¹ Pathogenesis of So-called Ear- and Nose-polyps, *Archiv. Italiano di Laryngologia*, 1912, No. 3.

discussion of the pathogenesis of so-called ear and nose polyps, refers to the views of Cozzolino, concerning the bacterial genesis of nasal polyps. In his personal bacteriological investigations of 24 cases of nasal polyps, and 13 cases of ear polyps, he found with special frequency the strepto bacillus, the diplococcus, and the staphylococcus, more rarely the pyocyanus. Blastomycetes were not discovered in any instance. The above mentioned germs may be credited with a certain etiological significance for the origin of chronic inflammations, and for the formation of polyps.

Two cases of *carcinoma of the middle ear* were reported by Milligan,¹ to the Otological Section of the Royal Society of Medicine. In the first case the growth was found, upon removal of the mastoid cortex, to arise from the tympanic mucosa. Rapid recurrence after operation, with facial paralysis, and death four months after admission to hospital. In the second case the left meatus was found upon examination to be full of friable and vascular granulation tissue, apparently from the microscopic report, a portion of a rapidly growing squamous-celled carcinoma. Upon removal of the mastoid cortex and exploration, the mastoid cells were found to be invaded by the growth, which extended backward to the lateral sinus and forward into the zygomatic area. The dura over the middle ear and mastoid antrum was involved. Removal as complete as possible gave relief, but recurrence quickly followed, and the patient was lost to observation.

At the same meeting of the Otological Section of the Royal Society of Medicine, C. E. West, F.R.S.C., presented a *patient four years after operation for carcinoma of the external meatus and tympanum*. The entire cartilaginous and bony meatus, with the pre-auricular and mastoid superficial tissues and lymphatic glands were involved, and extensive radical mastoid operation performed. The fact that after a lapse of four years no recurrence had followed this radical procedure, is a vindication of the plea of the general surgeon for extirpation of every possible macroscopic evidence of cancer.

Urbantschitsch reported before the Austrian Otological Society, January, 1912, a case of *scar carcinoma in the periosteum of the mastoid process*. In March and April, respectively, 1911, a paracentesis was performed for acute otitis media, and the mastoid antrum opened because of a continuation and increase of the inflammation. Relief from the persistent headache and other symptoms was experienced by the patient until December, 1911, when the headache recurred with such intensity as to prevent sleep. Upon examination at this time a tumor the size of a nut was found at the upper end of the post-aural wound, originating in the periosteum, and eroding the bone. Urbantschitsch offered the explanation that the neoplasm probably resulted from an inclusion of skin at the original operation.

¹ Journal of Laryngology, Rhinology, and Otology, February, 1912, pp. 93 and 94.

Three cases of *fibroma* or *fibro-angioma* of the middle ear were presented by A. J. Brady, of Sidney, Australia, before the Ninth International Otological Congress. His failure to gain information from the experience of others by reference to standard works on diseases of the ear, suggested that the cases might be worth recording. In each case the chief characteristic of the growth was the extremely free tendency to hemorrhage when attempts were made to remove them or even to apply the probe. In the first case the growth was successfully removed by galvano-cautery snare, with a few subsequent applications of the galvano-cautery. In the second case attempts at removal through the meatus (by another aural surgeon) were unsuccessful because of severe hemorrhage. Brady determined, therefore, to resort to a radical mastoid operation, which, because of hemorrhage, was accomplished in two stages, three days intervening. Recurrence, appearing after a month or so, was checked by chromic acid applications, and with glycerite of papain drops in the ear complete healing took place. No recurrence after seven years. In the third case after recurrence following attempt at removal of the growth through the natural channel, the growth was successfully removed as in the second case.

A case of *angiosarcoma* of the middle ear was reported by Urbantschitsch.¹ The interesting feature of the case was the shrinkage of the growth and the control of bleeding under continuous application of fresh lemon juice. The patient was a man, aged seventy-six years, who had been under observation eight years. Two unsuccessful attempts had been made at removal of the growth, which now presented at the meatus. Because of his age it was considered unwise to employ further operative interference, but because of the danger of hemorrhage some kind of treatment was necessary. The various applications employed proved unavailing, until fresh lemon juice was employed, with the result noted.

More difficult of diagnosis are the neoplasms involving the internal ear, or structures contiguous to it, giving rise to labyrinthine and other symptoms traceable to this portion of the mechanism of hearing. Among the cases of this character reported within the past year the following are of interest.

Ruttin² reported 2 cases of *glioma* which were of otological interest.

The first was *glioma* of the left cerebellum, with total atrophy of the left cochlear and vestibular nerves. The clinical diagnosis, based upon the total deafness and lack of caloric response on the left side, and a coarse horizontal rotatory nystagmus on both sides, was verified by autopsy.

The second case was one of *glioma* of the fourth ventricle, with advanced deafness and loss of vestibular response on the right side. The oto-

¹ Monats. f. Ohrenheilkunde, xlv, No. 4.

² Ibid., Nos. 4 and 7.

logical diagnosis of a probable central lesion of the eighth nerve was based upon the following findings: Almost complete deafness for speech, and markedly reduced range of perception for the middle forks, on the right side; no caloric reaction on the right, prompt response on the left, with giddiness; spontaneous horizontal nystagmus toward both sides, with vertical nystagmus upward; spontaneous horizontal nystagmus unaffected during the reduction of the caloric nystagmus toward the right. The clinical diagnosis in this case was confirmed by the autopsy findings. It is interesting to note, however, that in this case the cochlear and vestibular nerves at the internal meatus presented no macroscopic evidence of the existent pathological condition. Involvement of Deiter's nucleus presumably accounted for the otological manifestations.

A slowly growing *tumor of the cerebellopontine angle* was the diagnosis made by Beck¹ in a case presenting symptoms involving the internal ear. Accurate diagnosis in such a case could be made only at autopsy, which was not possible since the patient, a man, aged thirty-nine years, was still under observation and had been for two and one-half years, when the report was rendered.

The symptoms involved only the left ear, the right being intact. Examination, when first seen, elicited the following: Absolute deafness in left ear, tympanum intact, tinnitus; weak response to cold and hot caloric test; rotation normal; no spontaneous nystagmus. One year later, with the appearance of no additional symptoms, the caloric reaction was completely lost, and there was a gradual lessening of the duration of after-rotation nystagmus. A year and a half more elapsed, when the patient complained of uncertain gait and periodical attacks of vertigo. At this time which was about two months before the case was presented, examination gave the following: Pronounced spontaneous oscillatory nystagmus on looking to the left; duration of after-rotation nystagmus; to the right, eight to twelve seconds, to the left, twelve to fifteen seconds (ten times each); spastic paresis of left leg; Babinski, left; weakness of left facial nerve; hyperesthesia right cornea; anesthesia left cornea; ocular fundi normal, both sides. Beck considered these findings sufficient basis for the diagnosis of tumor of the cerebellopontine angle.

Engelhardt² points out the results of the hearing tests, in a case of *central neurofibromatosis*, suggesting that this may possibly represent an early symptom of the disease. During a period of observation of nine months, the limitation of the upper tone boundary remained fairly constant on the left side, while it gradually increased on the right. Tuning forks C, C₃ and C₄ were not heard on either side, through bone

¹ Monatsschrift f. Ohrenheilkunde, lxvi, No. 6.

² Hörbefund bei zentraler Neurofibromatose, Deutsch. med. Woch., 1912, No. 30, p. 1411.

or air conduction C, and C₂ were heard greatly shortened. There was bilateral acoustic paralysis, unilateral facial paralysis, trigeminal paresis, cerebellar ataxia, spontaneous nystagmus, non-irritability of the vestibular apparatus on both sides. On the basis of these findings, the diagnosis of *tumor of the posterior cranial fossa*, in the domain of the *acoustic nerve* was rendered. This diagnosis was modified, through the presence of sacral pains and cutaneous neurofibromas, scattered over the spinal and cerebral meninges.

Henschen,¹ of Stockholm, contributes a discussion of *tumors of the acoustic nerve*, and states that these belong to the processes of the posterior cranial fossa which can be demonstrated by means of the radiographic method. These tumors are very apt to give rise to changes of the skull bones, and to widen the internal auditory meatus to a considerable extent. These distentions may be demonstrable by the *x-ray*, as the first development of acoustic nerve tumors actually takes place in the depth of the internal auditory meatus, which is gradually filled by the slowly growing tumor, until the growth later on develops into a pontine tumor. The author reports the first case of tumor of the acoustic nerve, in which the diagnosis was confirmed radiographically. Although the question as to whether the acoustic nerve tumors can always be demonstrated by the *x-ray*, can only be answered theoretically, it seems as if they must become demonstrable by the radiographic examination, in view of the fact that the internal auditory meatus is very often greatly dilated when the tumor has reached considerable size.

Radiography therefore furnishes a new adjuvant for the establishment of the diagnosis of tumors of the acoustic nerve. In the absence of any dilatation of the internal auditory meatus in the radiogram, the assumption of a true acoustic nerve tumor can be excluded with a high degree of probability. Perhaps the rare tumors of the internal ear and the petrous bone pyramid can also be distinguished from the genuine acoustic nerve tumors, which destroy also the bone substance to a very wide extent, and not infrequently penetrate through the dura into the pontine angle, while the former merely distend the internal auditory meatus.

Zange² discussed the *anatomical changes in the labyrinth in cerebello-pontine tumors, and their clinical significance*, on the basis of a personal observation and the cases described in the literature. He arrives at the conclusion that cerebellopontine tumors with pure compression of the acoustic nerve, are usually associated with a pronounced atrophy of the cochlear nerve, in its entire peripheral neuron, with considerable

¹ Die Acusticus tumoren, eine neue Gruppe radiologisch darstellbarer Hirntumoren, Fortschritte auf dem Gebiete der Roentgenstrahlen, 1912, xviii, 207.

² Ueber anatomische Veränderungen in Labyrinth bei Kleinhirnbrückenwinkel-tumoren und ihre klinische Bedeutung, Virchow's Archiv, 1912, ccviii, 297.

or absent involvement of the vestibular nerve. The facial nerve seems to possess considerable power of resistance. The histological picture in the author's case differs in certain particulars from the findings in Whittmaack's experiments, but this is accounted for by the sudden contusion of all nerve elements, with preservation of the vessels, in the experiments; whereas in clinical cases, the tumor usually develops slowly, with unequal pressure upon the various portions of nerve trunk, and there may be congestion as well as secondary inflammatory changes of the labyrinth. The resemblance to the laboratory findings after experiments is still less in the cases of infiltration of the acoustic trunk with tumor masses; under these conditions the trunk may still contain intact nerve bundles, with corresponding normal areas in the nerve-end apparatus. Clinically, there may be no demonstrable disturbances of hearing or of equilibrium, in spite of the enormous size of the tumor; or their establishment may require extremely delicate functional tests.

The histological examination of the spindle-cell sarcoma in the cerebellopontine angle, showed an advanced degenerative atrophy of the cochlear nerve and its entire peripheral neuron, namely, disappearance of the ganglion cells in the spiral canal, and disappearance of the sense cells in Corti's region, while the vestibular nerve was found to be intact, aside from minor changes. Severe congestion, with bloody extravates, was also demonstrated in all parts of the labyrinth.

(Whittmaack's experimental investigations, with which the author compares his findings, concerned supraganglionic contusions of the acousticofacial nerve in animals.)

The Teaching of Otology in Medical Schools has been the subject, recently, of considerable discussion, which has brought to light some interesting information.

It may be recalled that at the 1911 meeting of the American Laryngological, Rhinological and Otological Society, Dr. S. MacCuen Smith presented an exhaustive résumé of the teaching of oto-laryngology in undergraduate and postgraduate medical schools. Reports were read concerning the teaching of otology in the following schools: Harvard University, Boston (Blake); University and Bellevue Hospital Medical College, New York City (Dench); College of Physicians and Surgeons, New York City (Bacon); Long Island Medical College, Brooklyn (Sheppard); University of Pittsburg (Day); University of Cincinnati (Holmes); Western Reserve, Cleveland (Ingersoll); Rush Medical School, University of Chicago (Ingals); College of Physicians and Surgeons, Chicago (Beck); St. Louis University, St. Louis, Mo. (Goldstein); College of Physicians and Surgeons, Atlanta, Ga. (Roy); University College of Medicine, Richmond, Va. (Dunn); Johns Hopkins University, Baltimore (Reik); University of Pennsylvania, Philadelphia (Randall); Jefferson Medical College, Philadelphia (MacCuen

Smith); McGill University, Montreal (Birkett); University of Toronto (Wishart); University of Vienna (Alexander); Vienna (Neumann); University of Glasgow (Barr); New York Post-Graduate Medical School (Phillips); Philadelphia Polyclinic (Roberts).

The purpose of this résumé was not so much to discover the relative number of institutions in which oto-laryngology forms a part of the curriculum, but to discuss the methods employed, or that should be employed, in the teaching of these subjects. In the majority of the schools in the United States and Canada, from which reports were received, the instruction was found to be almost wholly clinical. The greater number confine their teaching to the fourth year. Only seven made the definite statement that final examinations are required in these branches, although the various reports seemed to indicate that an examination, if not held by the respective chairs, is included in the general examination in medicine and surgery, in the remainder.

Of interest in connection with MacCuen Smith's résumé is the continued discussion of the subject.

In his presidential address before the Otological Section of the Royal Society of Medicine, Dr. W. Milligan¹ attributed much of the recent progress in otology, both in England and abroad, to advances in bacteriology, to more accurate pathological research, and to improvements in surgical technique. Another factor is the more intelligent and generous provision by hospital boards, both lay and medical, of facilities for the adequate treatment of persons suffering from diseases of the organ of hearing. To a large extent, this gradual evolution of otology has been "forced on by the unalterable law of demand and supply," the public demanding more scientific treatment of diseases of the ear, and hospital boards and the medical profession supplying the need. There remains, however, a lack of adequate legislation in the United Kingdom with reference to the teaching of otology. "So far as I have been able to ascertain," says Milligan, "not one of the universities of the United Kingdom insists upon its students having a practical and theoretical acquaintance with otology prior to qualification, while the only London medical school which insists upon its students attending aural clinics is the London Hospital."

During the past year the *Journal of Laryngology, Rhinology, and Otology* has published a series of articles on the teaching of otology and laryngology in Denmark, Germany, Italy, Austria-Hungary and France. The series was reviewed in the journal for November. We agree with the editor that these "articles cannot fail to serve a useful purpose, since in our newly developed specialty it is difficult to arrive at the organization of the clinics and the teaching that the more beaten

¹ Modern Developments in Aural Surgery and the Present Position of Otology in the Medical Curriculum, *Journal of Laryngology, Rhinology, and Otology*, January, 1912.

paths of general medicine and surgery have attained," and that "a comparison of the methods pursued in these countries will help us to realize the weak points in our own." "And if we have been slow," he continues, "to appreciate the far-reaching possibilities of a practical knowledge of diseases of the ear, nose, and throat, allowing Vienna to become the chief educational clinic for these specialties during the latter half of the nineteenth century, we may find some consolation in one fact brought out by our series of articles, viz., that our colleagues abroad have also suffered from the innate conservatism that has ever been characteristic of our profession. More recently the discussion at the annual meeting of the British Medical Association,¹ "On the Education of the Specialist," introduced by Prof. Holger Mygind, of Copenhagen, Dr. Watson-Williams, of Bristol, and Prof. Birkett, of Montreal, has shown that both in Holland and in Canada and the United States of America the education of the student, as well as of the specialist, needs systematizing and developing on the sound lines that obtain in the foundations and clinical sides of general medicine and surgery. Thus while recognizing that in this country there is an urgent call for more systematic training of the medical student in the elements of otolaryngology and of the graduate who desires to enter the ranks of specialists, we are sharing with nearly every other country the difficulties that beset those who break new ground; we should cover the virgin soil with richer harvest if the husbandry were more scientific. In Great Britain and Ireland there are fewer professors at the head of well-organized clinics than in Germany or Austria-Hungary, but, on the other hand, as in the United States, we have a larger number of hospital clinics under the direction of very competent specialists."

It will be interesting, as the years pass, to follow the influence upon the evolution of otological practice of the present-day discussion of the teaching of this special branch of medicine and surgery in undergraduate and postgraduate schools.

¹ Combined Sections on Laryngology, Rhinology, and Otology, British Medical Association, Annual Meeting, Liverpool, July, 1912.

INDEX

A

- ABSCCESS of lung, 74
 - peritonsillar, 297
- Accessory sinus disease, 281
- Achondroplasia, 251
- Acoustic nerve, tumors of, 350
- Actinomycosis treated with vaccines, 132
- Acute rhinitis, 279
 - treatment of, 279
 - vaccines in, 279
- Adenitis, 256
- Adenoid vegetations, aprosexia due to, 295
- Alcohol in accessory sinus disease, 272
- Alcoholic injections in treatment of trigeminal neuralgia, 35
- Amebic disease, treatment of, emetine, 147
- Anesthesia, local, in nose and throat operations, 269
 - in nose and throat operations, 267
 - regional, in the trigeminal territory, 38
- Aneurysms, aortic, 55
- Angina, Vincent's, 291
 - treatment of, 230
- Angiosarcoma of middle ear, 348
- Anthrax, salvarsan and, 133
- Antipertussis serum, 231
- Antitetanic serum, importance of pure, in tetanus, 207
- Antitoxin, diphtheria, 142
- Antityphoid vaccination, reactions in, 216
- Antroscope, 286
- Aortic aneurysms, 55
 - transplantations, 54
- Apical tuberculosis, 73
- Appendicitis due to oxyuris and trichocephalus, 170
- Aprosexia, 295
 - due to adenoid vegetations, 295
- Artificial respiration, pharyngeal insufflation in, 61
- Asphyxia neonatorum, 239
- Atrophic rhinitis, 280
- Aural neoplasms, 345
 - malignant, 345
 - polypi, 345
 - vertigo, 333

B

- BACILLARY dysentery, 148
- Bacillus, colon, infections, 141

- Bacillus, lepra, cultivation of, 156
 - leprosy, Bordet and Gengou reactions and, 157
 - of whooping cough and pertussis vaccines, 232
- Balantidium coli as cause of disease, 133
- Blood cultures in pneumonia, 177
 - pressure in pneumonia, 178
 - prognostic importance of tubercle bacilli in, in pulmonary tuberculosis, 212
- Bordet and Gengou reaction and leprosy bacillus, 157
- Bradycardia in mumps, 169
- Breast, 115
 - cancer of, 117
 - feeding, relation of, and infant mortality, 236
 - male, tumors of, 116
 - Paget's disease of, 115
- Brill's disease, typhus fever and, 225
- Bronchoscopy, 66

C

- CANCER, 84
 - of breast, 117
 - early, 119
 - metastasis in, 120
 - mobile, 119
 - peripheral, 120
 - results of operation in, 121
 - of esophagus, 78
 - as infectious disease, 128
 - inoperable, of throat, neck, and face, 304
 - of larynx, 92
 - intrinsic, 304
 - of lip, 87
 - of middle ear, 347
 - of mouth, 84
 - of pharynx, 90
 - of tongue, 88
- Carbolic acid treatment of tetanus, 206
- Carcinoma. *See* Cancer.
- Cardiac failure in diphtheria, management of, 146
 - massage, 53
- Cardiospasm, 79
- Carriers, diphtheria, 142
- Causes of tetanus, 205
- Central neurofibromatosis, 349
- Cephalic tetanus, 206
- Cerebrospinal fever, 134
 - diagnosis of, 137

- Cerebrospinal fever, new sign of, 137
 prophylactic vaccination
 against, 139
 serum in, administration of, 137
 fluid, globulin reaction in, 136
- Cervical glands, sarcoma of, Hodgkin's disease and, 101
 lymph nodes, 93
 ribs, 102
 symptoms of, 103
 treatment of, 106
- Child welfare, 237
- Children, chorea in, 249
 diseases of, 235
 enuresis in, 248
 atropine in, 248
 thyroid extract in, 248
 height and weight of, 239
 nephritis in, 247
 pneumococcal peritonitis in, 179
 pyelitis in, 247
 typhus fever in, importance of, 228
- Cholera, vaccination in, 140
- Chondrotomy, 73
- Chorea in children, 248
- Cisterna magna, drainage of, in treatment of otitic meningitis, 320
- Cochlear nerve, degeneration of, 332
- Colon bacillus infections, 141
- Cicatricial webs of esophagus, 81
- Congenital webs of esophagus, 81
 malformations of esophagus, 81
- Contagiousness of sweat of tuberculous individuals, 210
- Coryfin vaseline, 273
- Cultivation of filarial embryos, 149
 of lepra bacillus, 156
 of malarial plasmodia *in vitro*, 161
- Curative value of Leishmania culture "vaccine" in Oriental sore, 170
- D**
- DEFORMITIES of nose, external, 273
- Degeneration of cochlear nerve, 332
- Delayed development treated with thy-mus gland, 258
- Dentition, 246
- Diagnosis of cerebrospinal fever, 137
 of glanders by complement fixation, 150
 of Malta fever, 163
 of poliomyelitis, 185
 of typhoid fever, 213
- Diaphragmatic hernia, 57
- Diathesis, exudative, 254
- Diphtheria, 141, 291
 antitoxin, 142
 cardiac failure in, management of, 146
 carriers, 142
 staphylococcus treatment of, 143
 nasal, 277
 spasmogenic, 144
- Diphtheria toxin, production of immu-nity with overneutralized, 141
 treatment of, by heat, 146
 local, 291
 vaccine, 142
 wound, 145
- Disease, balantidium coli as cause of, 133
 of children, 235
 hookworm, 150
 thymol in, 152
 infectious, 123
 cancer as, 128
 putrid gases and, 131
 sanitary leagues and, 126
 of larynx, malignant, 303
 new febrile, 126
 rat-bite, 190
 treatment of, by salvarsan, 191
- Disinfection, 129
 of physicians' hands, 130
- Diverticulum of esophagus, 79, 80
- Dog fever, 172
- Drainage of cisterna magna in treatment of otitic meningitis, 320
- Dura, plastic operations on, 47
- Dysentery, bacillary, 148
- E**
- EAR noises, subjective, cause and origin of, 332
 syphilis of, 335
 salvarsan in treatment of, 335
- Edema in infants, 244
- Emetine, treatment of amebic disease with, 147
- Empyema, 68
 chronic, of maxillary sinus, operation for, 286
 of frontal sinus, external operation for, 284
- Enuresis in children, 248
 atropine in, 248
 thyroid extract in, 248
- Epidemic of icterus, 153
- Epilepsy, 41
- Esophageal diverticula, 80
- Esophagoscopy, 77
- Esophagus, carcinoma of, 78
 congenital malformations of, 81
 webs of, 81
 diverticulum of, 79
- Exophthalmic goitre, etiology of, 107
 mortality of, 111
 treatment of, 109
 x-ray, 114
- Experimental measles in monkey, 164
 tuberculosis meningitis, 46
 typhus fever, 225
- Experiments, inoculation, in leprosy, 157
- Exudative diathesis, 254
- F**
- FEVER, cerebrospinal, 134
 diagnosis of, 137

- Fever, cerebrospinal, new sign of, 137
 prophylactic vaccination
 against, 139
 serum in, administration of, 137
 dog, 172
 hemp, 172
 inanition, 245
 pappataci, 172
 of Pym, 172
 Rocky Mountain spotted, 191
 scarlet, 192
 simple continued, 172
 summer, 172
 three-day, 172
 typhoid, 213
 typhus, 224
 Fibro-angioma of middle ear, 348
 Fibroma of middle ear, 348
 Filarial embryos, cultivation of, 149
 Filterable viruses, 130
 Fistula, salivary, 82
 Foods, infant, 261
 Fourth of July tetanus, 203
 Fracture at base of skull, 49
 of sella turcica, isolated, 51
 Fulgurations as a method of combating
 laryngeal tuberculosis, 299

G

- GENITALIA, relation of nose to, 287
 Glanders, diagnosis of, by complement
 fixation, 150
 Glands, salivary, 82
 Glioma of fourth ventricle, 348
 of left cerebellum, 348
 Globulin reaction in cerebrospinal fluid,
 136
 Goitre, 106
 etiology of, 106
 exophthalmic, etiology of, 107
 mortality of, 111
 treatment of, 109
 x-ray, 114

H

- HEAD, 17
 Heart, 52
 massage of, 53
 wounds of, 52
 Height and weight of children, 239
 Hemiplegia, typhoid, 218
 Hemopericardium, traumatic, 56
 Hemorrhage in newborn, 241
 serum treatment of, 241
 Hemp fever, 172
 Hernia, diaphragmatic, 57
 Hexamethylenamin in rhinology, 271
 Hodgkin's disease and sarcoma of cer-
 vical glands, 101
 Hookworm disease, 150
 thymol in, 152
 Hygienic control of interstate bodies of
 water, 132

- Hypophysis, 17
 feeding of, 22
 implantation of, 21
 physiology of, 18
 prognosis of operations on, 34
 radiography of, 26
 symptoms of disorders of, 22

I

- ICTERUS, epidemic of, 153
 neonatorum, 242
 Immunity, production of, with over-
 neutralized diphtheria toxin, 141
 Immunization against plague, active and
 passive, 173
 Inanition fever, 245
 Infancy, malaria in, 159
 Infant, edema in, 244
 foods, 261
 mortality, 235
 relation of breast-feeding to, 236
 of market milk to, 237
 of social and economic con-
 ditions to, 237
 premature, 244
 care of, 244
 vomiting in, 259
 Infantile kala-azar, 155
 Infantilism, intestinal, 252
 Infection, colon bacillus, 141
 general, following tonsillitis, 294
 of rabbits with virus of poliomyelitis,
 184
 source of, in tuberculous lymph-
 adenitis, 95
 Infectious disease, 123
 cancer as, 128
 putrid gases and, 131
 transmission of, 128
 Influenza, 153
 Inoculation experiments in leprosy, 157
 Insufflation, intratracheal, 64
 pharyngeal, in artificial respiration,
 61
 Intestinal infantilism, 252
 myiasis, 169
 Intrathoracic tumors, 75
 Involvement of pancreas in mumps, 169
 Iodine in laryngeal tuberculosis, 299
 in treatment of smallpox, 200
 of whooping cough, 233

J

- JAWS, 83
 Jugular-bulb thrombosis, 343

K

- KALA-AZAR, infantile, 155
 Leishmania infections and, 153
 Koplik spots in measles, 166

L

- LABYRINTH**, 325
 changes in tumor of cerebellopon-
 tine angle, 350
 disease, differential diagnosis of, 333
 functional tests of, in aged, 328
 windows, affections of membranes
 of, 331
- Labyrinthitis**, chronic circumscribed,
 complicated by meningitis, 331
- Laryngeal tuberculosis**, 298
 fulguration in, 299
 dysphagia in, treatment of, 301
 iodine in, 299
 treatment of, blocking of inter-
 nal laryngeal nerve in,
 302
 electric cautery in, 301
 surgical, 301
 tuberculin in, 300
- Laryngology**, 267
- Laryngoscopy**, 305
- Larynx**, 298
 cancer of, 92
 intrinsic, 304
 malignant disease of, 303
- Leishmania infections**, kala-azar and, 153
- Lepra bacillus**, cultivation of, 156
- Leprosy**, 155
 inoculation experiments in, 157
 studies in specific therapy of, 158
 treatment of, nastin in, 158
 in United States, 156
- Lip**, cancer of, 87
- Local anesthesia** in nose and throat
 operations, 269
- Lung**, abscess of, 74
 chronic disease of, surgery of, 69
- Lymph nodes**, cervical, 93
- Lymphadenitis**, tuberculous, 93
 after-treatment of, 101
 operation in, indications for, 96
 operation in, manner of, 99
 source of infection in, 95
 x-rays in, 98
- Lymphatics** of nose, relation of, to
 cranial cavity, 274

M

- MALARIA**, 159
 with cerebellar symptoms, 159
 in infancy, 159
 prophylaxis of, 160
- Malarial plasmodium**, cultivation of, *in vitro*, 161
- Malignant disease** of larynx, 303
- Malta fever**, diagnosis of, 163
- Massage**, cardiac, 53
- Measles**, 164
 experimental, in monkey, 164
 Koplik spots in, 166
 salvarsan and, 167
 school closure in, 167
- Mediastinitis**, 73
- Mediastinum**, anterior, operations in, 72

- Meningitis**, 43
 of otitic origin, 311
 treatment of, 319
 surgical, by drainage of cisterna
 magna, 320
 tuberculous, experimental, 46
- Metastasis** in cancer of breast, 120
- Menthol** in nose, 272
- Methylene blue** in parameningococcus
 septicemia, 172
- Mobile cancer** of breast, 119
- Mortality**, infant, 235
 relation of breast feeding and,
 236
- Mouth**, cancer of, 84
- Mumps**, 168
 bradycardia in, 169
 involvement of pancreas in, 169
 orchitis of, treated by operation, 168

N

- NASAL diphtheria**, 277
 septum, submucous resection of, 275
- Nastin** in treatment of leprosy, 158
- Neoplasm**, benign and malignant, of ear,
 345
- Nephritis** in children, 247
- Nervous diseases**, scarlet fever in etiology
 of, 197
- Neuralgia**, trigeminal, 35
 treatment of, by alcoholic injec-
 tions, 35
- Neurofibromatosis**, central, 349
- New diagnostic sign** of scarlet fever, 195
 febrile disease, 126
 reaction for differentiating scarlet
 fever and similar eruptions, 195
 sign in cerebrospinal fever, 137
 species of spirocheta, 200
 typhoid fever test, 215
- Newborn**, hemorrhage in, 241
 serum treatment of, 241
 icterus in, 242
 ophthalmia in, 242
- Nose**, 273
 external deformities of, 273
 relation of, to genitalia, 287

O

- OBSTETRIC indentations** of skull, 51
- Operations** in anterior mediastinum, 72
 on hypophysis, prognosis of, 34
 plastic, on dura, 47
 results of, in cancer of breast, 121
 in tuberculous lymphadenitis, indi-
 cations for, 96
 manner of, 99
- Ophthalmia neonatorum**, 243
- Ophthalmoreaction** in typhoid fever, 214
- Optic neuritis** in course of whooping
 cough, 231
- Orchitis** of mumps, treated by operation,
 168

Oriental sore, curative value of Leishmania "vaccine" in, 170
 Otitic meningitis, 311
 Otology, 311
 teaching of, in medical schools, 351
 Otosclerosis, 338
 Oxyuris and trichocephalus, appendicitis due to, 170

P

PAGET's disease of breast, 115
 Pappataci fever, 172
 Paralysis, recurrent, of larynx, as result of dilated left auricle, 309
 Parameningococcus septicemia treated with methylene blue, 172
 Pellagra, simulium and, 173
 Perez's sign in tuberculosis, 212
 Pericardiectomy, experimental, 55
 Pericarditis, 56
 Peripheral cancer of breast, 120
 Peritonitis, pneumococcal, in children, 179
 Pertussis, 231
 prevention of, 232
 vaccines, bacillus of whooping cough and, 232
 Pharmacology of nose and throat, 271
 Pharynx, 289
 cancer of, 90
 Physiology of thoracic surgery, 59
 Picric acid, treatment of vaccination site with, 228
 Plague, 173
 active and passive immunization against, 173
 tarbagan and, 175
 Pharyngeal insufflation in artificial respiration, 61
 Plasma cells of tonsil, 293
 Plastic operations on dura, 47
 Pneumococcal peritonitis in children, 179
 Pneumonia, 175
 blood cultures in, 177
 pressure in, 178
 rectal irrigations in treatment of, 179
 sodium citrate in, 178
 urobilinuria in, 177
 Pneumothorax, artificial, in tuberculosis, 76
 Poliomyelitis, 181
 diagnosis of, 185
 prophylaxis of, 185
 transmission of, 182
 treatment of, 186
 epinephrin in, 186
 virus of, infection of rabbits with, 184
 Postoperative pulmonary complications, 76
 Practical control of typhoid fever, 220
 Premature infants, 244
 Prevalence of smallpox in United States, 200
 Prognathism, 83

Prophylactic vaccination against cerebro-spinal fever, 139
 Prophylaxis of malaria, 159
 of poliomyelitis, 185
 of tetanus, 203
 Prowazek bodies as diagnostic criterion and measure of infection in trachoma, 208
 Pupils, unequal, as early sign of pulmonary tuberculosis, 212
 Putrid gases and infectious diseases, 131
 Pylorus, spasm of, 250
 Pym, fever of, 172
 Pyelitis in children, 247

R

RABIES, 186
 a case cured by salvarsan, 189
 late cauterization of wounds infected with, by means of nitric acid, 188
 treatment of, with freshly prepared virus and that sent to a distance, 188
 in United States in 1911, 186
 Rachitis, 250
 Radiography of hypophysis, 26
 Rat-bite disease, 190
 treatment of, by salvarsan, 191
 Reaction in antityphoid vaccination, 216
 Rectal irrigation in treatment of pneumonia, 179
 Regional anesthesia in the trigeminal territory, 38
 Relation of nose to genitalia, 287
 Removal of tonsils, 296
 possibility of recurrence after, 296
 Rheumatism, 191
 Rhinitis, acute, 279
 treatment of, 279
 vaccines in, 279
 atrophic, 280
 hyperplastica edematosa, 278
 Rhinology, 267
 Ribs, cervical, 102
 symptoms of, 103
 treatment of, 106
 Rocky Mountain spotted fever, tick eradication and, 191

S

SALIVARY fistula, 82
 glands, 82
 gland, mixed tumors of, 83
 Salvarsan, anthrax and, 133
 a case of rabies cured by, 189
 measles and, 167
 in treatment of syphilis of ear, 335
 in yaws, 234
 Sanitary leagues and infectious diseases, 126
 Sarcoma of cervical glands, Hodgkin's disease and, 101

- Sarcoma of tongue, 92
 Scarlet fever, 192
 in etiology of nervous diseases, 197
 new diagnostic sign of, 195
 reaction for differentiating, and similar eruptions, 195
 serum, 193
 Moser's, in, 194
 transmission of, 194
 treatment of, with oil of eucalyptus, 197
 School closure in measles, 167
 Sella turcica, fracture of, isolated, 51
 Septic sore throat, 197, 289
 Septicemia, parameningococcus, treated with methylene blue, 172
 Serum, antipertussis, 231
 in cerebrospinal fever, administration of, 137
 Moser's, in scarlet fever, 194
 scarlet fever, 193
 treatment of hemorrhage in newborn, 241
 Shipboard, typhoid carrier on, 213
 Simple continued fever, 172
 Simulum, and pellagra, 173
 Sinus disease, accessory, 281
 frontal, 284
 empyema of, external operation for, 284
 Skull, fractures at base of, 49
 indentations of, obstetric, 51
 Smallpox, 200, 228
 prevalence of, in United States, 200
 treatment of, iodine in, 200
 Sodium citrate in pneumonia, 178
 Sokodu, 190
 Sore throat, septic, 197, 289
 treatment of, 199
 Spasm of pylorus, 250
 Spasmogenic diphtheria, 144
 Spirocheta, new species of, 200
 pure cultivation of, 201
 Sporotrichosis in man, 202
 treatment of, 203
 Stab wounds of thorax, 57
 Staphylococcus treatment of diphtheria carriers, 143
 Submucous resection of nasal septum, 275
 Successive cow-pox vaccination, 228
 Summer fever, 172
 Surgery of chronic disease of lung, 69
 Sweat, contagiousness of, in tuberculous individuals, 210
 Syphilis of ear and its treatment by salvarsan, 335
- T**
- TARBAGAN, plague and, 175
 Temperature, variations of, in diagnosis of tuberculosis, 211
 Test, functional, of labyrinth in aged, 328
 new, typhoid fever, 215
 Tetanus, causes of, 205
 cephalic, 206
 Fourth of July, 203
 prophylaxis of, 203
 treatment of, carbolic acid, 206
 importance of pure antitetanic serum in, 207
 Therapy of leprosy, specific studies in, 158
 Three-day fever, 172
 Thoracic surgery, physiology of, 59
 Thorax, 52
 stab wounds of, 57
 Thrombosis, jugular-bulb, 343
 Thymol in hookworm disease, 152
 Thymus gland, in delayed development, 258
 Thyroid gland in enuresis, 248
 Tick eradication and Rocky Mountain spotted fever, 191
 Tongue, cancer of, 88
 sarcoma of, 92
 Tonsils, 292
 faucial, effect of removal of, upon voice, 297
 pharyngeal, possibility of recurrence after removal of, 296
 plasma cells of, 293
 removal of, 296
 Tonsillitis, general infection following, 294
 Trachoma, Prowazek bodies as diagnostic criterion and measure of infection in, 208
 Transmission of infectious diseases, 128
 of scarlet fever, 194
 Traumatic hemopericardium, 56
 Treatment of amebic disease with emetine, 147
 of cervical ribs, 106
 of diphtheria by heat, 146
 local, 291
 of exophthalmic goitre, 109
 x-ray, 114
 of hemorrhage in newborn, serum in, 241
 of laryngeal tuberculosis, 298
 blocking of internal laryngeal nerve in, 302
 electric cautery in, 301
 surgical, 301
 of leprosy, nastin in, 158
 of poliomyelitis, 186
 epinephrin in, 186
 of rat-bite disease by salvarsan, 191
 of scarlet fever with oil of eucalyptus, 197
 of septic sore throat, 199
 of smallpox, iodine in, 200
 of sporotrichosis in man, 203
 staphylococcus, of diphtheria carriers, 143
 of syphilis of ear, salvarsan in, 335
 of tetanus, carbolic acid, 206
 of typhoid bacillus carriers with vaccines, 213
 fever, vaccine, 216
 of vaccination site with picric acid, 228

Treatment of Vincent's angina, 230
 of whooping cough, iodine in, 233
 Trichomonas hominis in gastric contents, 209
 Trigeminal neuralgia, 35
 treatment of, by alcoholic injections, 35
 Tubercle bacilli, relative prevalence of
 human and bovine, in bone and joint
 tuberculosis in children, 209
 Tuberculin in laryngeal tuberculosis, 300
 Tuberculosis, 209
 apical, 73
 artificial pneumothorax in, 76
 bone and joint, in children, relative
 prevalence of human and bovine
 tubercle bacilli in, 209
 laryngeal, 298
 dysphagia in, treatment of, 301
 fulguration as a method of
 combating, 299
 iodine in, 299
 treatment of, blocking of inter-
 nal laryngeal nerve in, 302
 electric cautery in, 301
 surgical, 301
 tuberculin in, 300
 Perez's sign in, 212
 pulmonary, prognostic importance
 of tubercle bacillus in blood
 in, 212
 unequal pupils as early sign of,
 212
 variations of temperature in diag-
 nosis of, 211
 Tuberculous lymphadenitis, 93
 meningitis, experimental, 46
 Tumors of acoustic nerve, 350
 of cerebellopontine angle, 349
 changes in labyrinth in, 350
 intrathoracic, 75
 of male breast, 116
 mixed, of salivary gland, 83
 Typhoid bacillus carrier on shipboard,
 213
 treatment of, with vac-
 cines, 213
 fever, 213
 diagnosis of, 213
 ophthalmoreaction in, 214
 practical control of, 220
 test, new, 214
 treatment of, vaccine, 216
 vaccination with living, sensi-
 tized typhoid bacilli in, 217
 vegetables as factor in dissemi-
 nation of, 218
 water supplies and control of,
 219
 hemiplegia, 218
 Typhus fever, 224
 and Brill's disease, 225
 experimental, 225
 importance of, in children, 228

U

UNITED States, leprosy in, 156
 Urobilinuria in pneumonia, 177

V

VACCINATION, antityphoid, reactions in,
 216
 in cholera, 140
 with living, sensitized typhoid bacilli
 in typhoid fever, 217
 prophylactic, against cerebrospinal
 fever, 139
 site, treatment of, with picric acid,
 228
 successive cowpox, 228
 Vaccine, actinomycosis treated with, 132
 diphtheria, 142
 treatment of typhoid bacillus carriers
 with, 213
 fever, 216
 Vegetables as factor in dissemination of
 typhoid fever, 218
 Verruca Peruana, 229
 Vertigo, aural, 333
 Vincent's angina, 291
 treatment of, 230
 Viruses, filterable, 130
 Vocal cord, paralyzed, a method of
 treating, 309
 Vomiting in infants, 259

W

WATER supplies and control of typhoid
 fever, 219
 Webs of esophagus, congenital or cicatricial, 81
 Weight, height and, of children, 239
 Whooping cough, 231
 bacillus of, and pertussis
 vaccines, 232
 optic neuritis in course of, 231
 prevention of, 232
 treatment of, iodine in, 233
 Wound diphtheria, 145
 of heart, 52

X

X-RAYS in tuberculous lymphadenitis, 98

Y

YAWS, salvarsan in, 234

University of Toronto

Biological Library
& Medical _____
Serials

**DO NOT
REMOVE
THE
CARD
FROM
THIS
POCKET**

Acme Library Card Pocket

Under Pat. "Ref. Index File"

Made by LIBRARY BUREAU

